Skin Cancer Profile

Overview and Evaluation of Skin Cancer in the State of Nevada

March 15, 2006

Department of Health and Human Services

Nevada State Health Division

Bureau of Community Health

Comprehensive Cancer Control Program

Kenny C. Guinn, Governor

Michael J. Willden, Director
Department of Health and Human Services

Alex Haartz, MPH, Administrator
Nevada State Health Division

Bradford Lee, M.D.
State Health Officer

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Thomas Lee, M.Ed., Health Program Specialist I

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Nevada Cancer
INSTITUTE

Spring 2006

Dear Friends,

Skin care and skin cancer are an issue of vital importance.

In fact, one type of skin cancer, melanoma can and does hit close to home. As a family, we know this all too well with the loss of a parent and sibling.

What is important is that there is a growing body of knowledge and awareness that can mitigate this growing threat.

Nevada has so much to offer with its natural beauty. We can enjoy our outdoor lifestyle through proactive awareness that includes skin protection and timely monitoring of changes to our skin.

This report provides the blueprint for a healthier Nevada by following the three "S"s of skin care: sensitivity to sun exposure, self-examination and seeking timely medical treatment.

At Nevada's official cancer institute, we are making skin cancer one of our highest priorities. We look forward to being your partner in improving the odds in this and other cancer areas.

Sincerely,

Heather Murren
President and CEO

Jim Murren
Member, Board of Directors

Skin Cancer Profile for Nevada

Acknowledgment goes to the following individuals for their contribution to the Nevada Skin Cancer Profile

Charlene Herst	Program Manager, Tobacco Prevention and Education Program, Bureau of Community Health, Nevada State Health Division
Deborah McBride, MBA	Chief, Bureau of Community Health, Nevada State Health Division
Ihsan Azzam, M.D., MPH	Nevada State Epidemiologist, Office of Epidemiology, Nevada State Health Division
Tanya Reid, M.A.	Education and Information Officer, Nevada Environmental Public Health Tracking System, Bureau of Community Health, Nevada State Health Division
Wei Yang, Ph.D.	State Biostatistician, Center for Health Data & Research, Bureau of Health Planning & Statistics, Nevada State Health Division
William Lee, B.S.	Biostatistician, Center for Health Data & Research, Bureau of Health Planning & Statistics, Nevada State Health Division
Megan Corradino, MPH	Biostatistician, Center for Health Data & Research, Bureau of Health Planning & Statistics, Nevada State Health Division
Milton Eisner, Ph.D.	Cancer Statistics Branch, Surveillance Research Program, National Cancer Institute

Executive Summary

Executive Summary

Skin cancer is the most prevalent of all cancers in the United States. The American Cancer Society estimates that over 1 million new nonmelanoma cancers will be diagnosed in 2005 and the majority of these are directly related to exposure to the sun. In addition, an estimated 59,350 cases of melanoma, another form of skin cancer that is more aggressive and potentially fatal, will be diagnosed in 2005. The ability to play and work safely is attainable with minor lifestyle modifications that limit direct exposure to the sun and increased awareness of these types of cancer. The use of sunscreens, limiting exposure during specific times of day, adjusting attire, and self-examination are just some of the recommendations proposed to decrease the risk for skin cancers.

The quality of life in the state of Nevada is a primary stimulus for the exponential growth the state is experiencing. One of the key factors in this growth is the overall climate of Nevada. Promotional literature often refers to the abundant number of sunshine days. Outdoor life and activities have been, and will be, an integral component of the allure for those seeking a variety of recreational endeavors. In addition to recreational pursuits, many Nevadans find themselves in outdoor settings in their professional roles. Regardless of the reason, Nevadans and others who visit are drawn to the variety of outdoor venues the state has to offer. This lifestyle also places many individuals at risk for potential health issues related to skin cancer.

In defining the quality of life in Nevada, one should also include the ability to pursue endeavors free of risk from potential harm. Skin cancer poses a real threat to the residents of the state. A risk that could be realistically reduced or minimized simply by eliminating overexposure to the sun and other forms of ultraviolet (UV) radiation (e.g., tanning beds, sunlamps). There will always remain factors related to genetic predispositions, prior behaviors and lifestyle, and other components that are difficult to address. However, skin cancers can significantly be reduced through a variety of simple changes in behavior. This profile will address the current state of skin cancers nationally and in Nevada, trends in education and prevention, and recommendations for interventions.

The intent of this profile is to present an overview of the types, causes, and prevalence of skin cancers. The public health implications related to skin cancers, both nationally and in Nevada, are significant and, in some cases, ignored or overshadowed by other diseases. Skin cancers are the most prevalent types of cancer and one of the most preventable forms of cancer.

Skin cancer affects the epithelial tissues of the skin and causes either structural damage to the tissues or mutation to the DNA of cells. Solar or other forms of radiation are acknowledged as the primary cause of most skin cancers. The two primary types of radiation linked to skin cancers are UV-A and UV-B, with UV-B radiation strongly linked to the more aggressive forms of skin cancer. The types of cancer range from the less invasive forms, such as squamous and basal cell, to the more aggressive forms such as melanoma. A number of risk factors affect the incidence of skin cancers and environmental factors play a significant part in the disease process. There is a higher prevalence and mortality by race (whites), by gender (men), and by age (35-84 year olds). Time was a critical factor related to overall survival. Early intervention, especially with melanoma, had a direct relationship to the overall survival rate. The most important factor

related to the survival of melanoma was the locus of diagnosis, which is also a time critical component and accounted for a difference in survival rates of 98 percent with a localized diagnosis down to 16 percent with a distal diagnosis.

Statistically, skin cancers, in general, account for the majority of all types of cancers with aggressive forms (i.e., melanoma) accounting for approximately 10 percent. Mortality rates vary depending upon the type of cancer, with melanomas mortality rates ranging from 20 - 25 percent depending on reporting year. Nevada has a significantly higher rate of melanoma than the national average and with additional refinements in the data collection systems will, in all probability, have a higher rate of skin cancer in general compared to the national average.

The complexity of skin cancer and the simplicity of intervention are strangely paradoxical. The facts, the anatomy and physiology, the demographics, and the statistics all converge into a simple cause and effect relationship. If exposed to adequate levels of radiation for an extended period, one will have a high risk of acquiring skin cancer. Nevadans are in an environment with a positive sun social norm, long periods of high UV radiation, and demographics nurturing for skin cancers. These elements are reflected in the current state of prevalence and mortality. The intervention strategies are simple: decrease the amount of exposure to radiation, self-examine for early skin cancer identification, and seek medical treatment as soon as possible. Implementation strategies involve provision of educational resources, the changing of behaviors, and the acknowledgement that the sun and other forms of radiation are potentially dangerous. Although the plan is simple, human nature and change are always complex adversaries.

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Skin cancer is the most prevalent of all cancers in the United States. The American Cancer Society estimates that over 1 million new nonmelanoma cancers will be diagnosed in 2005 and the majority of these are directly related to exposure to the sun. In addition, an estimated 59,350 cases of melanoma, another form of skin cancer that is more aggressive and potentially fatal, will be diagnosed in 2005. The ability to play and work safely is attainable with minor lifestyle modifications that limit direct exposure to the sun and increased awareness of these types of cancer. The use of sunscreens, limiting exposure during specific times of day, adjusting attire, and self-examination are just some of the recommendations proposed to decrease the risk for skin cancers.

The quality of life in the state of Nevada is a primary stimulus for the exponential growth the state is experiencing. One of the key factors in this growth is the overall climate of Nevada. Promotional literature often refers to the abundant number of sunshine days. Outdoor life and activities have been, and will be, an integral component of the allure for those seeking a variety of recreational endeavors. In addition to recreational pursuits, many Nevadans find themselves in outdoor settings in their professional roles. Regardless of the reason, Nevadans and others who visit are drawn to the variety of outdoor venues the state has to offer. This lifestyle also places many individuals at risk for potential health issues related to skin cancer.

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Method

A general search for information was conducted through various internet search engines, as well as focused searches for information from specific national sites related to cancer research. National sites included the American Cancer Society – Skin Cancer Facts and Cancer Reference Information: Overview – Skin Cancer – Melanoma; Centers for Disease Control and Prevention (CDC), National Center for Chronic Disease Prevention and Health Promotion – 2005/2005 Fact Sheet Skin Cancer: Preventing America's Most Common Cancer; The University of Texas: MD Anderson Cancer Center – Skin Cancer; and the University of California, Irvine: UCI Medical Center – Types of Skin Cancer.

Statistical information was obtained from the Centers for Disease Control and Prevention (CDC), National Center for Chronic Disease Prevention and Health Promotion – Cancer Prevention and Control; the American Cancer Society; the National Cancer Institute – Surveillance Epidemiology and End Results (SEER); the National Cancer Institute – State Cancer Profiles;

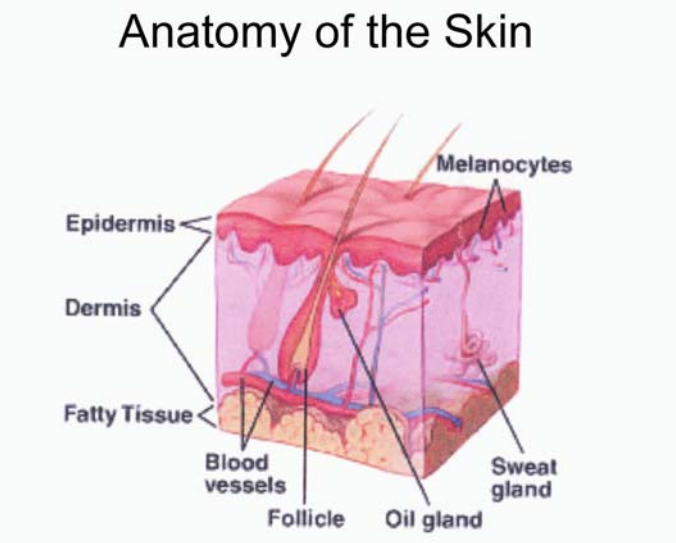
The North American Association of Central Cancer Registries – CINA + Online; the State of Nevada - Health Division, Bureau of Health Planning and Statistics – Nevada Interactive Health Database (NIHDS); Nevada Center for Health Data and Research – Report on Cancer in Nevada 1997-2001; and the United Health Foundation, America's Health: State Health Rankings 2004 Edition – Cancer Deaths. Special reports were generated by the State of Nevada - Health Division, Bureau of Health Planning and Statistics for skin cancer mortality rates specific to melanoma in Nevada 1998 - 2002.

Results

The research yielded information specific to the anatomical structure of the skin, and the disease process, regarding the effects of radiation on particular structures. The data highlighted the ramifications of skin cancer at cellular levels, the types of skin cancer, and the distribution, incidence, and mortality of the various types of skin cancers. It also clearly evaluated the effects of ultraviolet light (UV) on the skin and the implications related to skin cancer; and the risk factors and prevention strategies, including discussion of controversial or inconclusive research related to prevention.

Anatomy of the Skin

Skin is a type of epithelial tissue that is comprised of layers of cells. The outermost layer is composed of squamous cells on a base layer referred to as the basal lamina or basement membrane (Figure 1). The skin is the largest organ of the body and serves a number of functions including protection, absorption, and excretion. The skin also serves in temperature control, sensation, and pain reception. Epithelial cells are avascular, meaning the cells are not nourished by an active blood supply and are reliant on the connective tissues for nutrients through absorption. Melanocytes, which regulate pigmentation of the skin, are located in the lower layers of the skin and in close proximity to the connective tissues. The physical levels of the skin have a direct correlation to specific cancers, the consequences to UV exposure, and ultimately outcomes related to survival rates.



Hemmings, M., Yang, W., DeJan, E., (2001). *State of Nevada Health Division - Bureau of Health Planning and Statistics: Nevada Report on Cancer*. http://health2k.state.nv.us/nihds/publications/1997.2001Report/Report.pdf.

Figure 1: (Appendix F - page 51)

Types of Skin Cancer

The research and information reviewed categorized cancers into nonmelanoma and melanoma types. The nonmelanoma cancers mentioned were squamous cell and basal cell carcinomas, while melanoma exclusively represented the remaining category. Nationally, the nonmelanoma category accounts for a little over 90 percent of all skin cancers, but it also tends to have a low mortality rate. Conversely, melanoma types of cancers have an incidence rate of approximately 5.6 percent, but account for 74 percent of all skin cancer related deaths. The successful treatment outcomes and survival rates for nonmelanoma type cancers are high with early intervention and proper treatment. Basal cell cancers are rarely fatal and tend to spread slowly. Squamous cell cancers also spread slowly with a low mortality rate, but can be fatal if treatment and intervention is delayed.

Melanoma cancers however spread quickly and are much more aggressive. They have variable outcomes and survival rates that correlate directly with early intervention and treatment. Melanoma also has a mortality prediction rate relative to the location (i.e., local, regional, or distal) of the cancer at the time of diagnosis. Localized melanoma occurs in melanocytes in the lower layers of the skin, regionalized melanoma has invaded into other tissues adjacent to the skin, and the most aggressive type is the distal form, which has migrated to other regions of the body (e.g., lungs, brain, bone, etc.) Currently, the rate of diagnosis for melanoma at a local site is 93 percent. The range of survival over a five year period is 98 percent if found locally with early intervention but drops dramatically to 16 percent if found at a distal site. Exposure to the sun is consistently noted in most of the research as one of the main factors attributed to all three types of cancers. Additionally, exposure to UV-B radiation is believed to cause mutations in the DNA of melanocytes and consequently is the major causal factor in the formation of melanoma types of cancer.

Skin Cancer Distribution, Incidence, and Mortality

The state of Nevada has a significantly higher incidence rate of both skin cancer (excluding squamous and basal) and melanoma than the national average. Melanoma is the fifth leading type of cancer in Nevada and accounts for 6.7 percent of all cancers in the state. There is a significant gender discrepancy in both incidence and mortality rates, with men more at risk than women. Men were also more prone to contracting skin cancer regardless of race, with whites more prone to contracting skin cancers than African-Americans or Hispanics. White men were most at risk for contracting skin cancers of both types and subsequently dying from the disease. Age is also a significant factor in skin cancers, with incidence and mortality increasing into the middle years and then maintaining a fairly consistent pattern throughout the remainder of the age spectrum until the 85+ age group. This distribution pattern is consistent with the premise that over time additional exposures to UV radiation and the cumulative cellular damage to the skin is progressive. It also demonstrates the extent of the general population that is at risk for these types of cancers.

Ultraviolet Light (UV)

The effects of sunlight, tanning beds, and other forms of UV radiation were consistently noted in the literature as a significant risk factor in the causes of skin cancers of all types. The incidences of squamous and basal forms of skin cancer were considered direct consequences of overexposure to the sun or other UV producing light sources. The direct physical damage to cells secondary to exposure was considered the primary cause of cancerous lesions. The contribution of UV radiation in the formation of melanoma was less clear, but the general consensus was that exposure of melanocytes to UV-B radiation created changes in the DNA of the cells, which in turn created mutation within the cells.

The use of sunscreen was germane to this discussion and remains at the center of controversy related to the premise that sunscreen causes cancers. The discussion relates to studies reflecting increased incidence of skin cancer in individuals using various sunscreens or sunblocks. The latest studies show no direct link between sunscreen and increased incidence, but does note that individuals using sunscreen are often those with increased risk factors. There was also discussion regarding this same group extending their exposure to the sun or other radiation sources because of the belief and misconception that sunscreen would provide enough protection to mitigate the additional risk from extended exposure.

Risk Factors

Risk factors were consistently noted across resources and were similar between nonmelanoma and melanoma types of skin cancer. As with any medical condition, the risk factors range through the spectrum of physical predispositions, behavioral choices, and environmental influences. As noted in previous sections, changing exposure to UV radiation is the primary intervention consistently cited in the literature. The risk factors consistently cited in the literature were:

- Exposure to UV radiation (sun, sunlamp, tanning beds)
- Fair complexion
- Occupational exposure to coal tar, pitch, creosote, arsenic compounds, or radium
- Family history
- Multiple or atypical moles
- Immune suppression
- Age
- Gender
- Severe sunburns as a child
- Xeroderma Pigmentosum
- Past history of melanoma

Prevention

The primary methods and approach to skin cancer prevention in the literature follows an avoidance and surveillance precept. Interventions such as decreasing UV radiation exposure, utilizing sunscreens and sunblocks, altering exposure times, and changing clothing choices were a few of the examples recommended for prevention. Self-examination techniques and the close observation of moles, etc. form the foundation for the skin cancer surveillance process. The interventions are easy to learn, easy to implement, and require minimal financial resources. The major challenges for implementation are the dissemination of information, the education of health professionals, the education of the public, and the changing of human behaviors. As with most health related situations, motivations seem to appear more readily after the diagnosis of the disease.

Discussion

Overview of Skin Cancer

In the world of modern medicine, complexity can be the reality and the norm. The human physiology can be daunting and medical interventions many times require extensive planning and resources. Skin cancer, in contrast, is rather straightforward and the cause and effect process relative to skin cancer is quite simple. The more exposure one has to Ultraviolet (UV) Rays, the greater the risk for contracting skin cancer in one form or another. The form appears to be in direct relationship to the extent or level of damage to the skin over time. The damage incurred during childhood in the form of sunburns can have a devastating effect on the health of the young adult. The addition of a variety of risk factors, as with any disease, also increases the chances of contracting skin cancer.

The layered structure of the skin is designed to protect the human body from a number of dangers, as well as perform a number of functions related to temperature control, absorption, and sensation. The exposure of these layers of the skin to UV radiation and the damage incurred from the exposure is also reflected in the type and severity of skin cancers. The American Cancer Society estimates that more than 1 million cases of nonmelanoma types of cancer will be diagnosed every year in the United States. The nonmelanoma cancers include basal cell and squamous cell types of skin cancer. These types of cancers constitute 90 percent of all skin cancer and are usually treated in a physician's office. These types of cancer are not currently classified as a reportable disease, so the full extent of incidence remains unknown. Basal cell cancers usually grow at a very slow rate and are rarely lethal. Nevertheless, there is a possibility of disfigurement and considerable damage to the skin which can require extensive reconstruction and discomfort. Basal cell cancers reflect damage to the underlying layer of the skin or what is referred to as the basal lamina. Squamous cell cancer is the second type of nonmelanoma cancer. It is less common than basal cell cancer, but can be more dangerous. The squamous cells make up the outer layer of the skin and form the first line of defense for the body. As with basal cell cancer, the damage is primarily to the structure of the skin, but this form of cancer grows at a faster rate and can be fatal if not treated appropriately. Both types of cancer primarily manifest as localized tissue damage and the damage is primarily physical in nature.

The more invasive forms of skin cancer, and potentially more lethal types, include melanoma, which represents less than 10 percent of all skin cancers, but it is responsible for roughly 74 percent of all skin cancer deaths. Melanoma forms when melanocytes, which are cells in the lower levels of the skin, are damaged and the DNA structure of the cells changes or mutates. Melanocytes are instrumental to skin pigmentation, and the darkening or tanning process. The physical location of these cells is in close proximity to the connective tissues, which, unlike the skin, has a viable blood supply. The change or mutation in these cells and the possibility of migration through the blood supply make this type of skin cancer a serious health threat. Survival is in direct relationship to the location of the melanoma at the time of diagnosis. Melanoma can manifest locally, regionally, or distally, and the distal forms are often referred to as metastatic melanoma. At present, approximately 83 percent of all melanoma cases are diagnosed at the local stage. The five year survival rate for melanoma diagnosed at the local stage is approximately 98 percent. Melanoma diagnosed at the regional stage has a drop in the five year survival rate to 60 percent, and at the distal stage survival drops to 16 percent.

Risk Factors

As with all disease, risk factors constitute an important part of the equation regarding contracting or being predisposed to a particular disorder. Skin cancer also has genetic, environmental, and behavioral factors that can increase or decrease the potential for acquiring the disease. Individuals with a fair complexion, a family history, multiple or atypical moles, Xeroderma Pigmentosum, and a past history of melanoma are at higher risk due to their genetic makeup. Individuals exposed to coal tar, pitch, creosote, arsenic compounds, or radium as a part of their occupation, those receiving various medical treatments, and those that are immune suppressed are at higher risk. Finally, the behavioral factors such as sunburns as a child or duration of exposure to UV radiation weigh heavily on the equation.

The significance of this discussion lies in the potential to alter outcomes through change in attitudes and behavior. Exposure to UV radiation is cited as the major cause in nonmelanoma types of cancer and a significant factor in the development of melanoma type cancer. The two types of UV radiation, UV-A and UV-B, have been found to cause damage to the skin and the general consensus is that no type of UV radiation is safe. UV-B type radiation has been found to cause damage to the DNA of melanocyte cells, which is the primary cause attributed to the development of melanoma. It would follow that decreasing exposure would in turn decrease the incidence of skin cancers. Therefore, simple adjustments in behavior by individuals, especially individuals with significant risk factors, would dramatically change the incidence and mortality related to skin cancer.

Skin Cancer Interventions

The development of effective intervention procedures for skin cancer requires reasonable educational, behavioral, and personal surveillance components, as well as modification of individual beliefs toward UV radiation exposure, and personal responsibility. Some of the elements of change include decreasing the length of exposure to UV Radiation, altering the times of radiation exposure to avoid high intensity hours, adjusting clothing choices to provide

additional coverage, and properly applying appropriate sunscreens. These interventions combined with monitoring moles, monthly skin self-examination, and early treatment would dramatically decrease the mortality attributed to skin cancer, especially melanoma. Perhaps the most difficult obstacle to overcome in early intervention strategies with skin cancer may be the current perception of the sun as health enhancing and the misconception of radiation sources as benign entities.

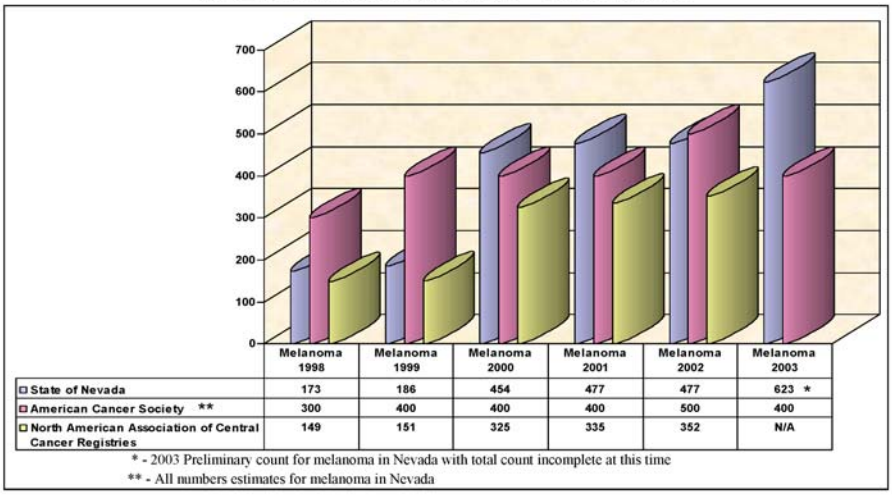
Incidence and Mortality of Skin Cancer in Nevada

Data Variations and Implications

The evaluation of data relative to cancer in general, and skin cancer specifically, proved more difficult than expected. The methodology, classification, the variety in application of census data, and lag time in reporting made the analysis of data intensely challenging. Although the reporting systems have improved significantly over the past five years, these mechanisms, both nationally and in Nevada, are still in an evolutionary state. As the various systems coordinate and refine the communication process, the quality of shared information and data will continue to improve over time, which will create a better overall picture regarding skin cancers throughout the nation. The negative impact in evaluation and analysis of skin cancers in the short term will be the lack of clarity regarding the true dimensions of the incidence and mortality for these cancers and the potential delays or possible failure to mobilize resources appropriate to address the full extent of the problem.

Figure 2: (Appendix F - page 52)

1998 - 2003 Variations in National and State Incidence Counts or Estimates for Melanoma By Total, and Type – State of Nevada



	Melanoma 1998	Melanoma 1999	Melanoma 2000	Melanoma 2001	Melanoma 2002	Melanoma 2003
State of Nevada	173	186	454	477	477	623 *
American Cancer Society **	300	400	400	400	500	400
North American Association of Central Cancer Registries	149	151	325	335	352	N/A

* - 2003 Preliminary count for melanoma in Nevada with total count incomplete at this time

** - All numbers estimates for melanoma in Nevada

State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Detailed Types of Cancer 2000 – 2003 and Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports.* Carson City, NV. November 2 and 3, 2005.. See Appendix B and C.

State of Nevada Health Division - Bureau of Health Planning and Statistics. Nevada Interactive Health Database – Cancer Module. Retrieved September 26, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?.

American Cancer Society. Cancer Facts and Figures 1998 - 2002. [Online] Available: http://www.cancer.org/docroot/STT/stt_0.asp

The North American Association of Central Cancer Registries, CINA + Online. 1998 - 2002 Skin Cancer (Excluding Basal and Squamous) and Melanoma. Retrieved September 27, 2005, from http://www.naaccr.org/cinap/index.htm

In general, the nationally recognized organizations on cancer have underestimated, for the most part, both the incidence and mortality rates for cancer in Nevada (Figure 2). There are a number of explanations for this discrepancy, but the most apparent one may simply be that the reporting and communication systems between states and national entities are still in an evolutionary status. The conversion of organizations to the age adjusted calculations based on the census of 2000 may also account for the shifting of incidence.

Other issues include inconsistencies in nomenclature (i.e., ICD codes included in specific cancer diagnosis, or melanoma diagnosed at distal locations), limitations in staffing resources for updating registry numbers, and delays in reporting times. The National Cancer Institute estimates these delays in reporting to be twenty-two months from the end of a reporting year to the actual time of reporting nearly two years later. The most recent data available for evaluation in Nevada is from the year 2003, but these figures remain incomplete at this time. The sharp increase in the incidence of melanoma in Nevada from 477 to 623 between reporting years 2002 and 2003 is alarming, but whether this increase is predictive remains unknown. Most assuredly, these numbers will increase and the best predictors of significance will occur when the calculations converting the overall numbers into an incidence per 100,000 format is completed and available for evaluation. What is disconcerting is the potential that the total numbers will escalate considerably in the interim between the years 2003 – 2005.

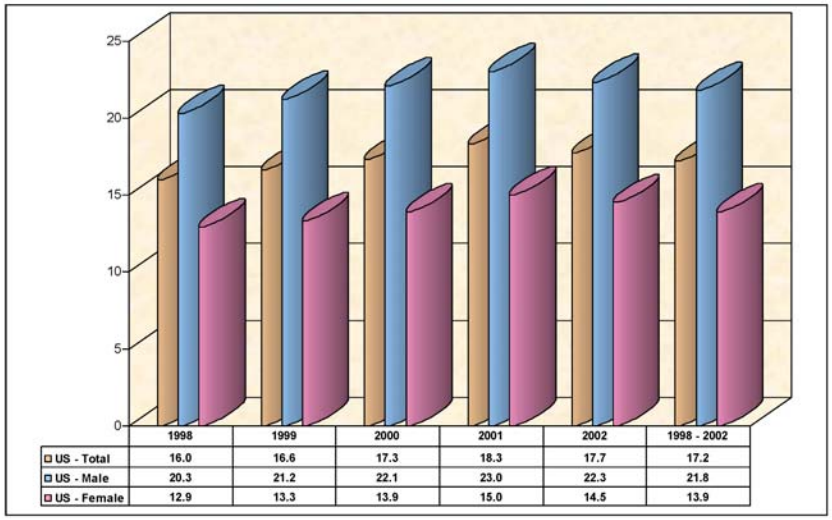
Evaluation of National Data on Skin Cancer

Irrespective of the data variations, the numbers regarding incidence and percentages of the types of cancers, the gender implications, racial incidence and mortality, and age distribution have been consistent over various agencies and organizations. The general trend for skin cancers reflect a steady increase in incidence with a peak in incidence occurring in reporting year 2001 (Figure 3). Mortality rates followed a similar trend as the incidence data with a slight offset in time by one to two years, which would logically follow considering the nature and course of the diagnosis and treatment cycle of the disease. Shifting to the age adjusted calculations based on the 2000 census may possibly account for some aspects of these trends, but additional observation and reporting would be required to make a definitive statement regarding incidence and mortality.

The National Cancer Institute estimates there will be 66,000 people diagnosed with some form of skin cancer in 2005 nationally. Of this group, 59,580 or a little over 90 percent of these individuals will be diagnosed with melanoma, which is potentially the most dangerous and lethal of the skin cancers (Figure 4). These estimates also reflect a consistent trend in gender prevalence for skin cancer. A greater percentage of men, approximately 57 percent, are diagnosed with skin cancers.

Figure 3: (Appendix F - page 53)

1998 - 2002 Incidence Rate Per 100,000 for Skin Cancer (Excluding Basal and Squamous) By Total and Gender – National

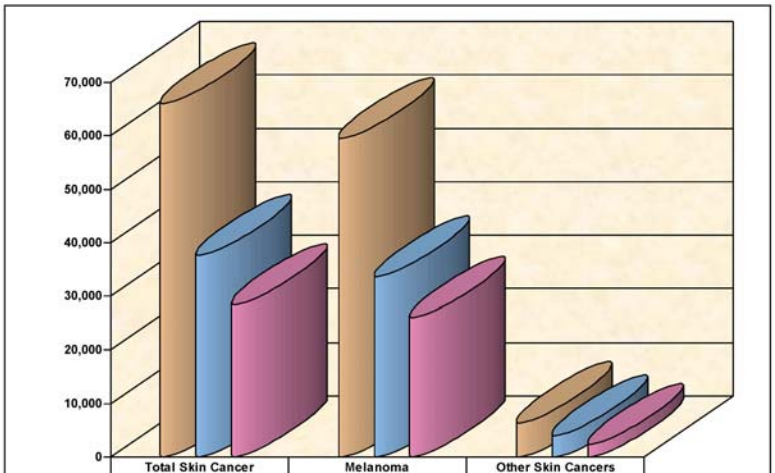


	1998	1999	2000	2001	2002	1998 - 2002
US - Total	16.0	16.6	17.3	18.3	17.7	17.2
US - Male	20.3	21.2	22.1	23.0	22.3	21.8
US - Female	12.9	13.3	13.9	15.0	14.5	13.9

The North American Association of Central Cancer Registries, CINA + Online. 1998 - 2002 Skin Cancer (Excluding Basal and Squamous) and Melanoma. Retrieved September 30, 2005, from http://www.naaccr.org/cinap/index.htm

Figure 4: (Appendix F - page 54)

2005 Incidence Estimates for Skin Cancer (Excluding Basal and Squamous) By Total, Type, and Gender - National



	Total Skin Cancer	Melanoma	Other Skin Cancers
All	66000	59580	6420
Men	37580	33580	4000
Women	28420	26000	2420

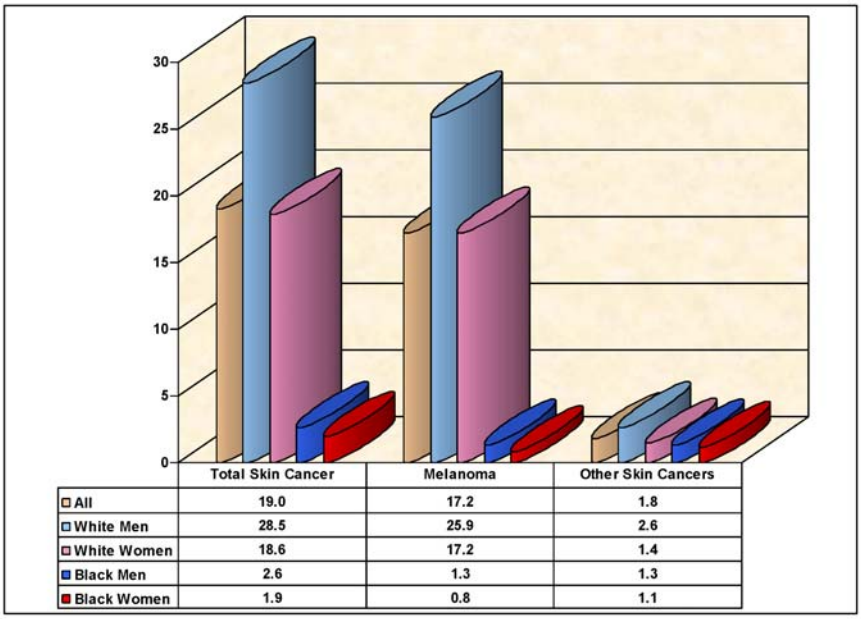
National Cancer Institute, Cancer Stat Facts. Cancer of the Skin (Excl. Basal and Squamous). Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/skin.html?statfacts_page=skin.html&x=16&y=12

National Cancer Institute, Cancer Stat Facts. Melanoma of the Skin. Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/melan.html?statfacts_page=melan.html&x=15&y=15

The data additionally reflected an increased incidence in whites and men (Figure 5). In perspective, the observation in respect to race was predictable based on risk factors. The gender variance remains less clear and any observation would be mere speculation. The data regarding mortality rates is consistent with the aforementioned observations (Figure 6). Mortality rates in men are more than twice the rate for women and white men have a mortality rate more than three and half times the rate for black men.

Figure 5: (Appendix F - page 55)

1998 - 2002 Incidence Rate Per 100,000 for Skin Cancer (Excluding Basal and Squamous) By Total, Type, Gender, and Race - National



	Total Skin Cancer	Melanoma	Other Skin Cancers
All	19.0	17.2	1.8
White Men	28.5	25.9	2.6
White Women	18.6	17.2	1.4
Black Men	2.6	1.3	1.3
Black Women	1.9	0.8	1.1

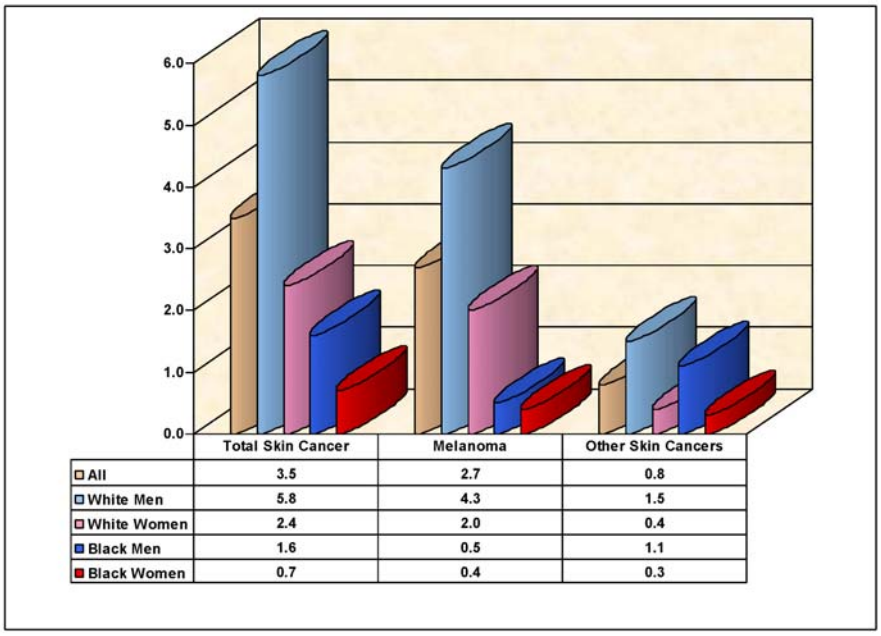
National Cancer Institute, Cancer Stat Facts. Cancer of the Skin (Excl. Basal and Squamous). Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/skin.html?statfacts_page=skin.html&x=16&y=12

National Cancer Institute, Cancer Stat Facts. Melanoma of the Skin. Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/melan.html?statfacts_page=melan.html&x=15&y=15

As with gender and race, age distributions followed a specific and predictable course. The development of skin cancer is by nature a slowly progressive condition exacerbated by repetitive exposure to UV radiation. The data reflects that there is a direct correlation between progression in age and an increase in skin cancer incidence and mortality. An increase in incidence begins to escalate in the 20-34 year old age group, peaks in the 45-54 year old age group, and declines slowly throughout the remaining age groups until it sharply decline in the 85+ age group (Figure 7). The explanation for the decrease in incidence for the 85+ age group may simply be the lack of surviving individuals remaining with related risk factors due to attrition from skin cancers or a variety of other disease process.

Figure 6: (Appendix F - page 56)

1998 - 2002 Mortality Rate Per 100,000 for Skin Cancer (Excluding Basal and Squamous) By Total, Type, Gender, and Race - National



	Total Skin Cancer	Melanoma	Other Skin Cancers
All	3.5	2.7	0.8
White Men	5.8	4.3	1.5
White Women	2.4	2.0	0.4
Black Men	1.6	0.5	1.1
Black Women	0.7	0.4	0.3

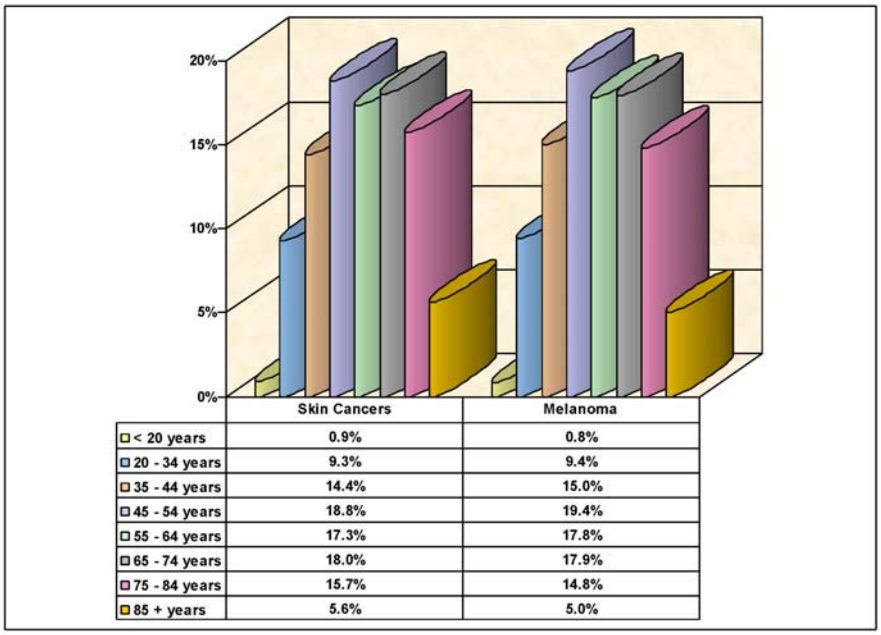
National Cancer Institute, Cancer Stat Facts. Cancer of the Skin (Excl. Basal and Squamous). Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/skin.html?statfacts_page=skin.html&x=16&y=12

National Cancer Institute, Cancer Stat Facts. Melanoma of the Skin. Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/melan.html?statfacts_page=melan.html&x=15&y=15

Mortality rates followed a similar course, but once again with a slight temporal shift (Figure 8). The elapsed time between diagnosis, treatment, and a terminal diagnosis would account for the shift in time and shows the severity of melanoma relative to time. As noted in previous discussions, the locus of diagnosis in melanoma is critical to initial survival and the potential for long-term recovery. Time is ultimately the most crucial determining factor in the progression of skin cancer and early diagnosis is critical to a positive potential for survival. Therefore, the increased incidence and mortality reflected in the data would appear consistent with the normal course of progression for skin cancers.

Figure 7: (Appendix F - page 57)

1998 - 2002 Diagnosis of Skin Cancer (Excluding Basal And Squamous) - By Age Group, Type, and Percentage - National



	Skin Cancers	Melanoma
< 20 years	0.9%	0.8%
20 - 34 years	9.3%	9.4%
35 - 44 years	14.4%	15.0%
45 - 54 years	18.8%	19.4%
55 - 64 years	17.3%	17.8%
65 - 74 years	18.0%	17.9%
75 - 84 years	15.7%	14.8%
85 + years	5.6%	5.0%

National Cancer Institute, Cancer Stat Facts. Cancer of the Skin (Excl. Basal and Squamous). Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/skin.html?statfacts_page=skin.html&x=16&y=12

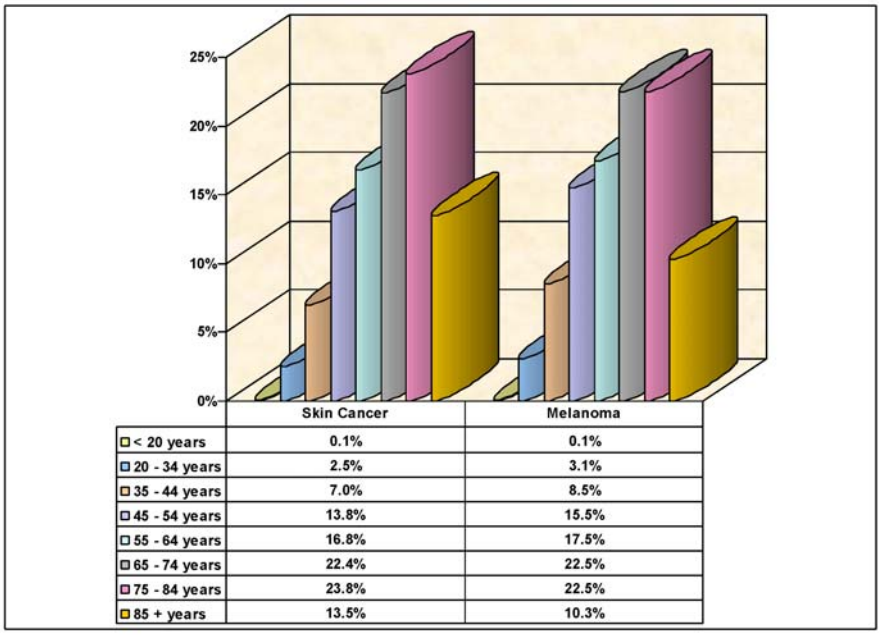
National Cancer Institute, Cancer Stat Facts. Melanoma of the Skin. Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/melan.html?statfacts_page=melan.html&x=15&y=15

Evaluation of Nevada Data on Skin Cancer

The unique climate, geography, health care logistics, and demographics of Nevada combine to create a complex and challenging public health environment. The bulk of Nevada's population is concentrated in two urban areas with one additional emerging urban area. The remaining population is distributed over large areas with limited resources in the extreme locales. Nevada has a wide range of geographical features and terrains from low to high desert with an abundant number of sunny days. The National Weather Service, in the Monthly Means and Maximums data for Las Vegas, rated the UV Index as High to Very High six to seven months out of the year (Figure 9). The number of sunny days, the intensity of the UV radiation, and the outdoor lifestyle in Nevada presents an environment with maximal risk for the development of skin cancers.

Figure 8: (Appendix F - page 58)

1998 - 2002 Mortality Rate for Skin Cancer (Excluding Basal and Squamous) - By Age Group, Type, and Percentage - National



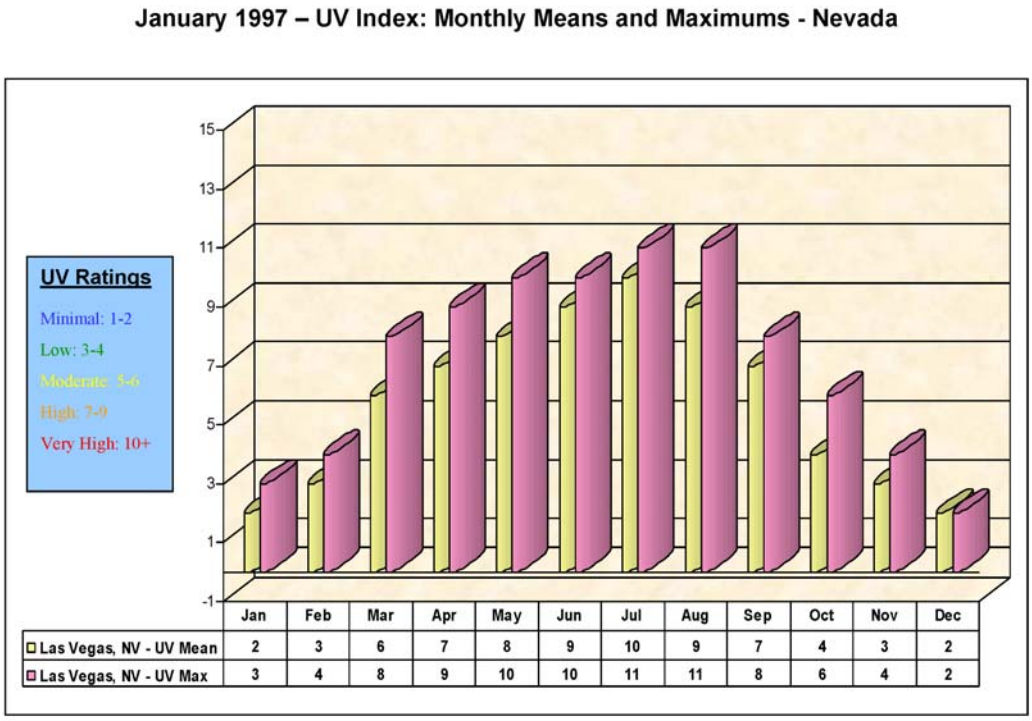
	Skin Cancer	Melanoma
< 20 years	0.1%	0.1%
20 - 34 years	2.5%	3.1%
35 - 44 years	7.0%	8.5%
45 - 54 years	13.8%	15.5%
55 - 64 years	16.8%	17.5%
65 - 74 years	22.4%	22.5%
75 - 84 years	23.8%	22.5%
85 + years	13.5%	10.3%

National Cancer Institute, Cancer Stat Facts. Cancer of the Skin (Excl. Basal and Squamous). Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/skin.html?statfacts_page=skin.html&x=16&y=12

National Cancer Institute, Cancer Stat Facts. Melanoma of the Skin. Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/melan.html?statfacts_page=melan.html&x=15&y=15

Additional risk factors associated with the development of skin cancer in relation to the demographic distributions within Nevada further increases the risk potential. The combination of these factors also presents a difficult environment for quality data acquisition. The Nevada State Health Division, through the Bureau of Health Planning and Statistics, has and continues to develop infrastructure to increase the accuracy and quality of data in Nevada. As the reporting systems improve and the data becomes better defined, verifiable trends are emerging in wide range of public health concerns. As the data collection process has improved, an alarming trend is evolving which appears to support the premise that Nevadans are in fact at high risk for the development of skin cancers.

Figure 9: (Appendix F - page 59)

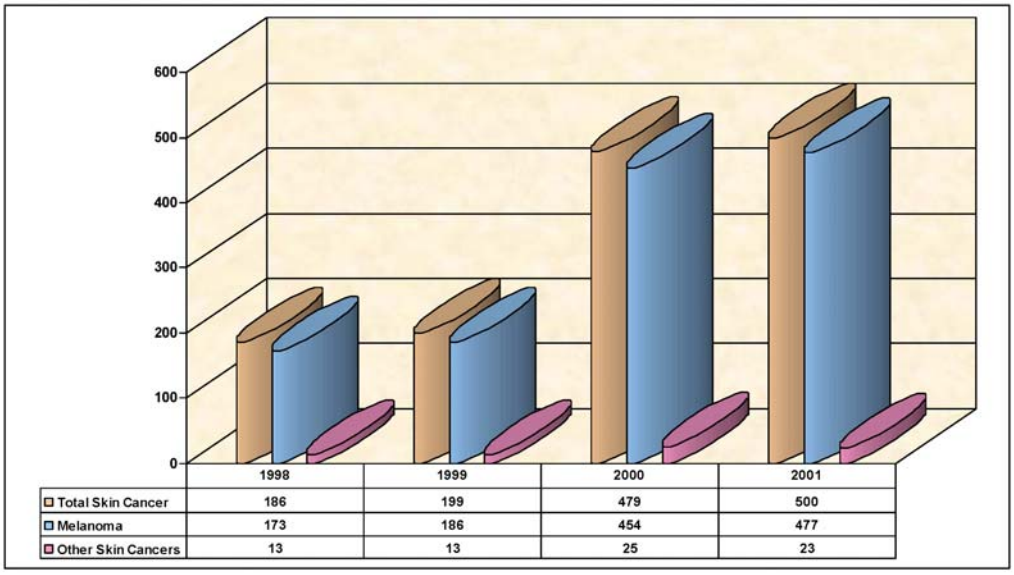


The National Oceanic and Atmospheric Administration's, National Weather Service – Climate Prediction Center. UV Index: Monthly Means and Maximums (January 1997). Retrieved November 17, 2005, from http://www.cpc.ncep.noaa.gov/products/stratosphere/uv_index/uv_meanmax.html

The initial discussion of the data analysis process for Nevada incidence and mortality rates must include a brief dialog about the evolution of the data collection within the state system. In the Nevada Report on Cancer in Nevada 1997 – 2001, a discussion on the limitations of data pre-1999 referred to the potential pitfalls in adequately portraying trends and creating credible predictions based on the current data. The changes in reporting related to age adjusting and the 2000 census may have also created shifts in baselines that are clearly apparent between the 1999 and 2000 reporting period. One should rationally question a jump in incidence rates of nearly two and a half times over a one year span if not given context for the shift (Figure 10). The subsequent presentations and the emerging data specific to melanoma will show a definite under-reporting in previous years of both incidence and mortality for skin cancer in the state of Nevada.

Figure 10: (Appendix F - page 60)

1998 - 2001 Incidence for Skin Cancer (Excluding Basal and Squamous) By Total and Type – Nevada



	1998	1999	2000	2001
Total Skin Cancer	186	199	479	500
Melanoma	173	186	454	477
Other Skin Cancers	13	13	25	23

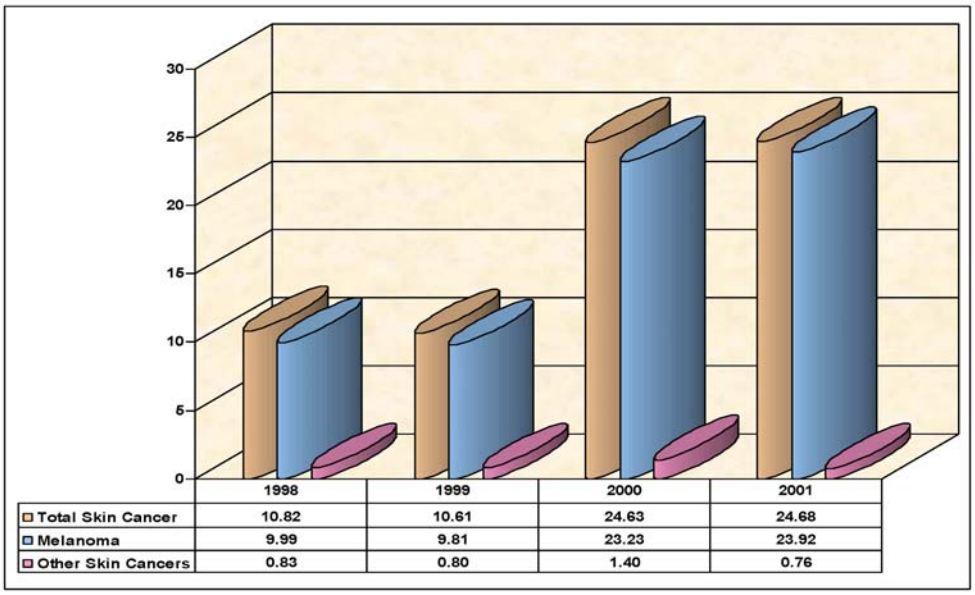
State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Detailed Types of Cancer 2000 – 2003 and Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports.* Carson City, NV. November 2 and 3, 2005.. See Appendix B and C.

State of Nevada Health Division - Bureau of Health Planning and Statistics. Nevada Interactive Health Database – Cancer Module. Retrieved September 26, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?.

The incidence of skin cancers in Nevada and the associated breakouts for specific sub-types of skin cancers showed a much higher incidence and percentage rate of melanoma than expected relative to the totals for all skin cancers (Figures 10 and 11). The number of cases and the range of percentage for incidence of melanoma in Nevada from 1998 – 2001 was 93.0 - 95.4 percent, with the percentage actually increasing as the quality of the data improved over time. The disturbing implication of this observation is that people in Nevada are contracting a potentially lethal skin cancer at a much higher rate than expected and the total numbers are continuing to increase. Out of the context of the incidence rate per 100,000, it is difficult to say definitively at this time in which direction the trend is moving.

Figure 11: (Appendix F - page 61)

1998 - 2001 Incidence Rate Per 100,000 for Skin Cancer (Excluding Basal and Squamous) By Total and Type – Nevada



	1998	1999	2000	2001
Total Skin Cancer	10.82	10.61	24.63	24.68
Melanoma	9.99	9.81	23.23	23.92
Other Skin Cancers	0.83	0.80	1.40	0.76

State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports*. Carson City, NV. November 3, 2005.. See Appendix C.

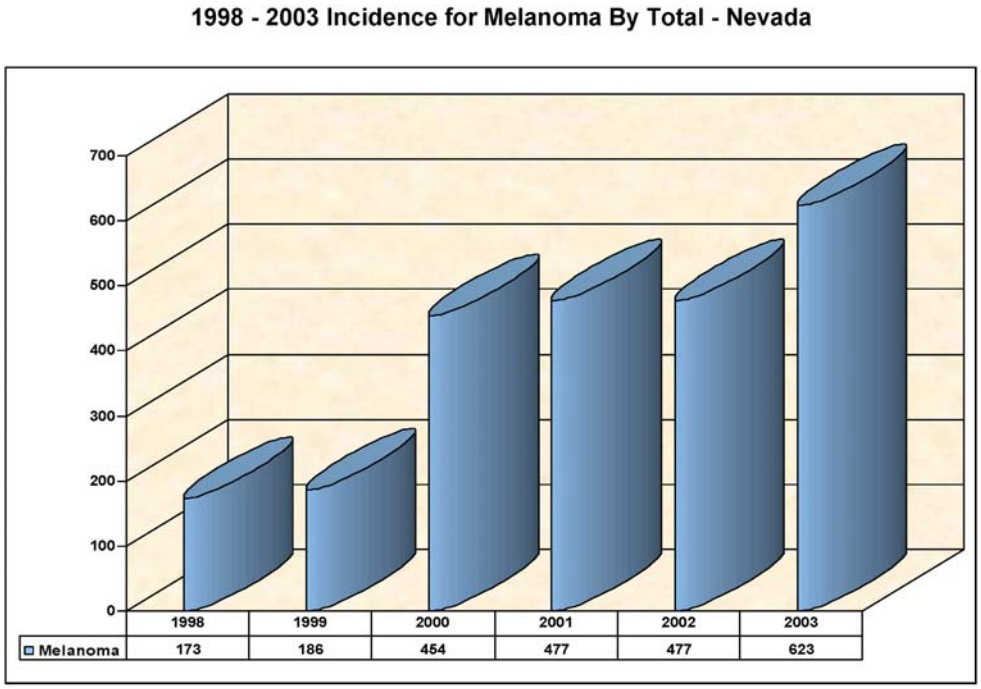
State of Nevada Health Division - Bureau of Health Planning and Statistics. Nevada Interactive Health Database – Cancer Module. Retrieved September 27, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?.

The evaluation of data specific to skin cancer in Nevada presented additional challenges regarding ICD coding and the matching of similar types of cancers categorized within the Skin Cancer (Excluding Basal and Squamous) designation. This dilemma remains unresolved at this time.

The data on melanoma, however, was specific and served as the benchmark for comparisons in the evaluation of trends related to skin cancer. The quality of the melanoma data provided reasonable assurance that assumptions and predictions were defensible and conclusions tenable. The general ratio of melanoma to total skin cancer in Nevada made observations generally predictive, but would require additional clarification of coding and a more in depth study to make the numbers for all categories of skin cancer specifically predictive. The melanoma data for Nevada has similar trends and percentages within specific groups, although the overall numbers have reflected a sharp increase in overall cases diagnosed (Figure 12).

As mentioned earlier, reporting has increased significantly since the year 2000 in Nevada. The increase in population in general in Nevada can also be a factor in the increase in cases in general since 1998. Perhaps the most significant observations made about melanoma were in the

Figure 12: (Appendix F - page 62)



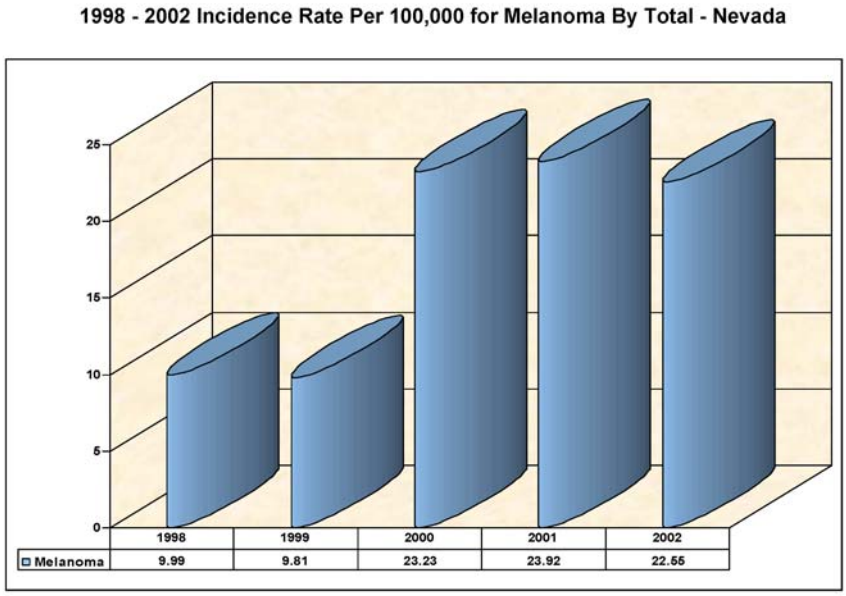
State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Detailed Types of Cancer 2000 – 2003 and Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports.* Carson City, NV. November 2 and 3, 2005.. See Appendix B and C.

State of Nevada Health Division - Bureau of Health Planning and Statistics. Nevada Interactive Health Database – Cancer Module. Retrieved September 26, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?.

incidence rate per 100,000. The numbers have increased significantly since 1998, but the rate has shown stabilization over the years 2000 – 2002 (Figure 13). The data collection and reporting process appears functional and the numbers reflected are essentially an accurate representation of melanoma cancer in Nevada. Unfortunately, the numbers reflected are significantly high relative to the national data.

The data related to gender was consistent with national data, with men representing the majority of both incidence and mortality figures for melanoma. In the overall numbers for Nevada, men represented a significant portion of the mortality count and the percentage for melanoma (Figure 14). There appears to be no clear explanation for the variance in rates related to gender and any theory ventured would be supposition.

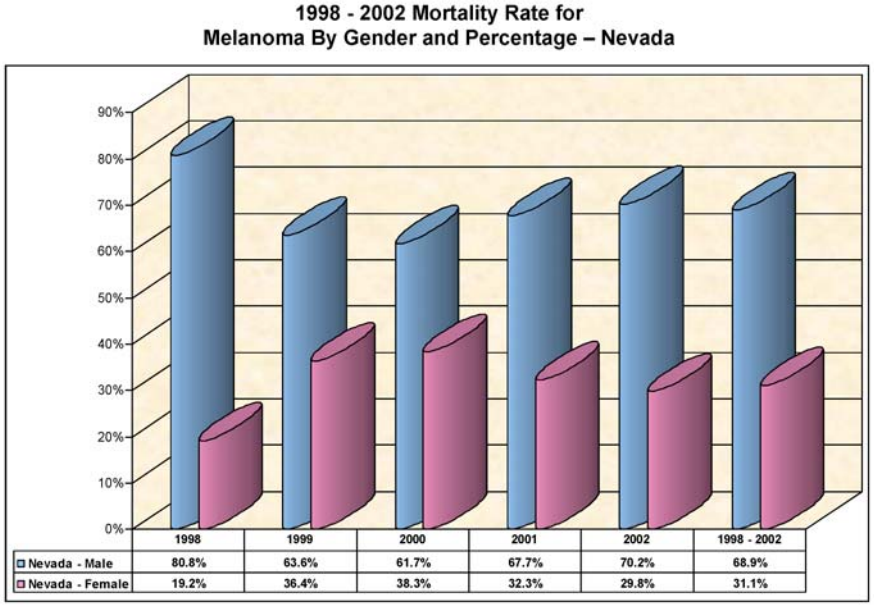
Figure 13: (Appendix F - page 63)



State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Detailed Types of Cancer 2000 – 2003 and Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports.* Carson City, NV. November 2 and 3, 2005.. See Appendix B and C.

State of Nevada Health Division - Bureau of Health Planning and Statistics. Nevada Interactive Health Database – Cancer Module. Retrieved September 26, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?.

Figure 14: (Appendix F - page 64)



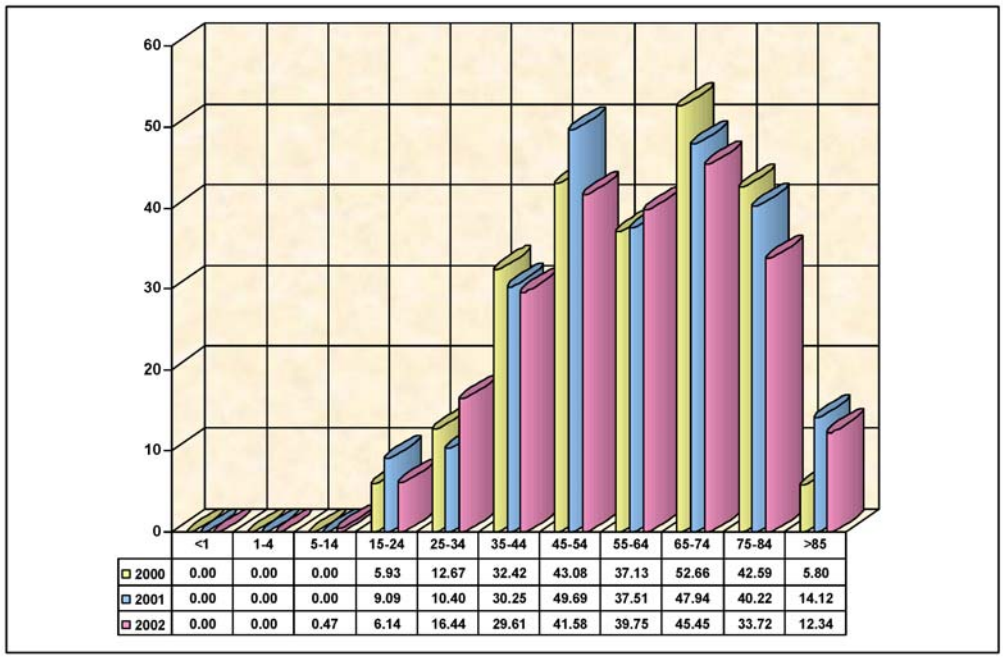
State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Deaths Due To Malignant Melanomas – Special Report.* Carson City, NV. October 10, 2005. See Appendix A.

The data related to age distribution was also consistent with national figures and information. The specific progression of skin cancer in general dictates the incidence and mortality progression within age groups. The consequences of an environment with a naturally high UV radiation index, multiple exposures over time and a population demographic with multiple risk factors are reflected in the consistent age related incidence and mortality of melanoma (Figures 15 and 16).

Once again, the distribution for incidence shows a sharp increase beginning in the 35 – 44 year old age group and sustains throughout the 75-84 year old age group. What is of note is the incidence rates increase to approximately 45 – 50 per 100,000 in the 45 – 54 year old age group and then shows another spike in the 65 – 74 year old age group. The corresponding increases in mortality rates per 100,000, for similar but not precisely matched age groupings, reflect a mortality percentage of 20.9 - 23.4 percent or approximately 1:5 ratio of mortality to incidence.

Figure 15: (Appendix F - page 65)

2000 - 2002 Incidence Rate Per 100,000 for Melanoma By Age Group - Nevada

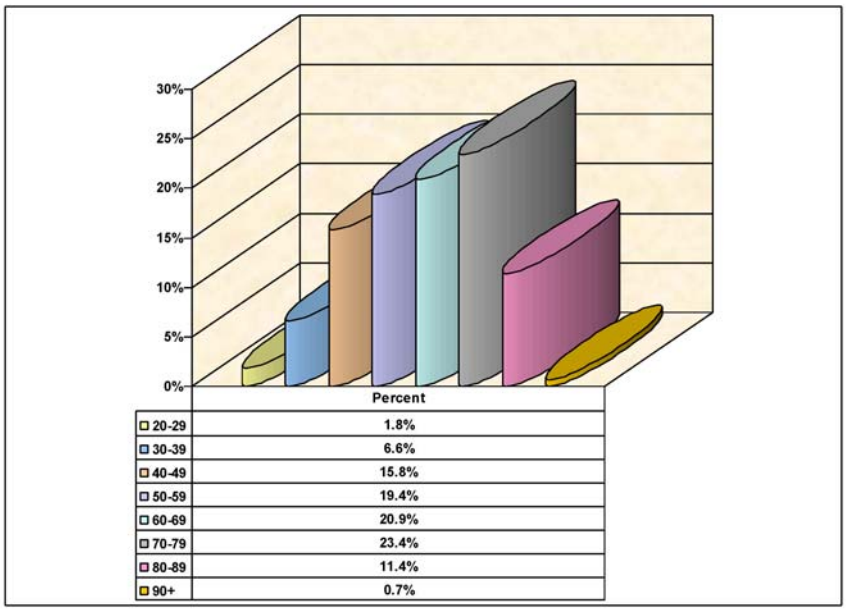


	<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	>85
2000	0.00	0.00	0.00	5.93	12.67	32.42	43.08	37.13	52.66	42.59	5.80
2001	0.00	0.00	0.00	9.09	10.40	30.25	49.69	37.51	47.94	40.22	14.12
2002	0.00	0.00	0.47	6.14	16.44	29.61	41.58	39.75	45.45	33.72	12.34

State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports*. Carson City, NV. November 3, 2005.. See Appendix C.

Figure 16: (Appendix F - page 66)

1998 - 2002 Mortality Rate for Melanoma By Age Group and Percentage - Nevada



State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Deaths Due To Malignant Melanomas – Special Report*. Carson City, NV. October 10, 2005. See Appendix A.

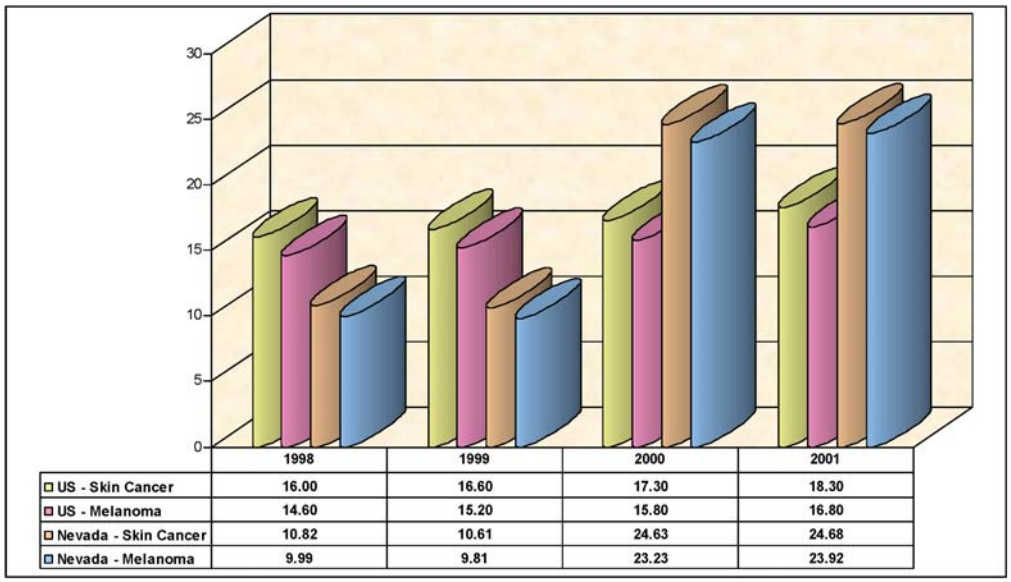
Comparison of National versus Nevada Data

Although the information on skin cancer generally, and to melanoma specifically, in Nevada was compelling, the most dramatic case is made in the comparisons with national information. The figures for Nevada were so far out of sync with nationally reported data that there was an assumption made that the information was incorrect or misreported. The Nevada Bureau of Health Planning and Statistics subsequently rechecked the information to determine the accuracy of the data. The outcome of their inquiry verified that the spike in numbers shown initially in the years 2000 and 2001 were in fact accurate (Figure 17).

Even though the general information related to skin cancer remained tentative and the use of the data potentially risky, the numbers for melanoma were both substantial and reliable. One can make the argument that the overall numbers for skin cancer will always exceed the specific numbers for melanoma based solely on the data being inclusive of melanoma in the overall skin cancer category. For the scope, content, and context of this report, the data for melanoma will suffice for the Nevada and national comparative analysis. The most appropriate and accurate comparative data is reflected in the incidence of melanoma per 100,000 (Figure 18). It is also the most illustrative of the issues related to skin cancer facing Nevada in comparison to the national situation.

Figure 17: (Appendix F - page 67)

1998 - 2001 Incidence Rate Per 100,000 for Skin Cancer (Excluding Basal and Squamous) By Type – Nevada Versus National



	1998	1999	2000	2001
US - Skin Cancer	16.00	16.60	17.30	18.30
US - Melanoma	14.60	15.20	15.80	16.80
Nevada - Skin Cancer	10.82	10.61	24.63	24.68
Nevada - Melanoma	9.99	9.81	23.23	23.92

The North American Association of Central Cancer Registries, CINA + Online. 1998 - 2002 Skin Cancer (Excluding Basal and Squamous) and Melanoma. Retrieved September 27, 2005, from http://www.naaccr.org/cinap/index.htm

State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Detailed Types of Cancer 2000 – 2003 and Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports.* Carson City, NV. November 2 and 3, 2005.. See Appendix B and C.

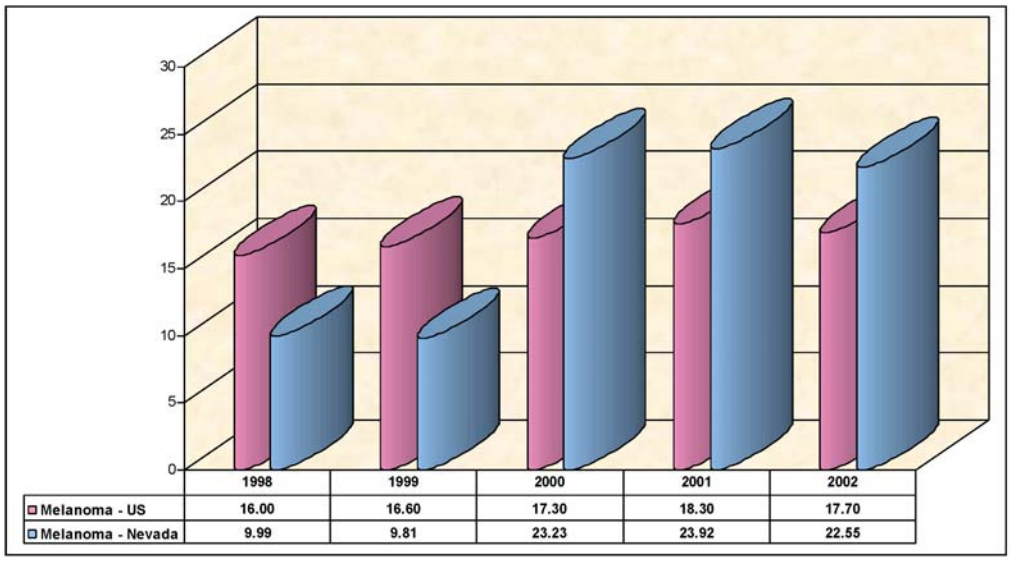
State of Nevada Health Division, Bureau of Health Planning and Statistics, Nevada Interactive Health Database – Cancer Module. Retrieved September 26, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?

The additional information provided for the year 2002 in the data for melanoma in figure 18 further illuminates the elevated incidence rate for melanoma in Nevada. The information also provides validation of the quality of data in relationship to national figures and trends. In the context of the comparison, Nevada's rates have shown consistency in incidence trends relative to national rates, except with a much higher incidence. The elevated variance for Nevada, during the years 2000 – 2002, has ranged from 4.85 – 5.93 incidences per 100,000, which translates to 1.27 – 1.34 times more incidence in Nevada than the national average for melanoma. As mentioned previously, these numbers were initially questioned regarding their validity and were verified as accurate.

With this said, the next issue of contention considered was the possibility of a large confidence interval, which would significantly minimize the variance. The confidence interval was established at the 95 percent level for all data and even considering the maximums and minimums of the lower and upper figures, the rate of variance remained substantial. Ultimately, these figures were determined to be accurate and the validity of the variance documented. The conclusion was that Nevada in fact has a significantly elevated incidence of melanoma and a potentially elevated incidence rate for other types of skin cancer.

Figure 18: (Appendix F - page 68)

1998 - 2002 Incidence Rate Per 100,000 for Melanoma – Nevada versus National



	1998	1999	2000	2001	2002
Melanoma - US	16.00	16.60	17.30	18.30	17.70
Melanoma - Nevada	9.99	9.81	23.23	23.92	22.55

State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Detailed Types of Cancer 2000 – 2003 and Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports.* Carson City, NV. November 2 and 3, 2005.. See Appendix B and C.

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Conclusion

The intent of this profile has been to present an overview of the types, causes, and prevalence of skin cancers. The public health implications related to skin cancers, both nationally and in Nevada, are significant and, in some cases, ignored or overshadowed by other diseases. Skin cancers are the most prevalent types of cancer and one of the most preventable forms of cancer.

Skin cancer affects the epithelial tissues of the skin and causes either structural damage to the tissues or mutation to the DNA of cells. Solar or other forms of radiation are acknowledged as the primary cause of most skin cancers. The two primary types of radiation linked to skin cancers are UV-A and UV-B, with UV-B radiation strongly linked to the more aggressive forms of skin cancer. The types of cancer range from the less invasive forms, such as squamous and basal cell, to the more aggressive forms such as melanoma. A number of risk factors affect the incidence of skin cancers and environmental factors play a significant part in the disease process. There is a higher prevalence and mortality by race (whites), by gender (men), and by age (35-84 year olds). Time was a critical factor related to overall survival. Early intervention, especially with melanoma, had a direct relationship to the overall survival rate. The most important factor related to the survival of melanoma was the locus of diagnosis, which is also a time critical

component and accounted for a difference in survival rates of 98 percent with a localized diagnosis down to 16 percent with a distal diagnosis.

Statistically, skin cancers, in general, account for the majority of all types of cancers with aggressive forms (i.e., melanoma) accounting for approximately 10 percent. Mortality rates vary depending upon the type of cancer, with melanomas mortality rates ranging from 20 – 25 percent depending on reporting year. Nevada has a significantly higher rate of melanoma than the national average and with additional refinements in the data collection systems will, in all probability, have a higher rate of skin cancer in general compared to the national average.

The complexity of skin cancer and the simplicity of intervention are strangely paradoxical. The facts, the anatomy and physiology, the demographics, and the statistics all converge into a simple cause and effect relationship. If exposed to adequate levels of radiation for an extended period, one will have a high risk of acquiring skin cancer. Nevadans are in an environment with a positive sun social norm, long periods of high UV radiation, and demographics nurturing for skin cancers. These elements are reflected in the current state of prevalence and mortality. The intervention strategies are simple: decrease the amount of exposure to radiation, self-examine for early skin cancer identification, and seek medical treatment as soon as possible. Implementation strategies involve provision of educational resources, the changing of behaviors, and the acknowledgement that the sun and other forms of radiation are potentially dangerous. Although the plan is simple, human nature and change are always complex adversaries.

Appendix A:

Appendix A:

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Appendix B:

Appendix B:

Glossary

Distal - Situated away from the point of attachment or origin or a central point especially of the body

Epithelial – The adjective related to the noun epithelium

Epithelium - A membranous cellular tissue that covers a free surface or lines a tube or cavity of an animal body and serves especially to enclose and protect the other parts of the body, to produce secretions and excretions, and to function in assimilation

Local - Of, relating to, or characteristic of a particular place**:** not general or widespread, relating to, or applicable to part of a whole, involving or affecting only a restricted part of the organism

Metastasis - Change of position, state, or form: as a transfer of a disease-producing agency from the site of disease to another part of the body or a secondary metastatic growth of a malignant tumor

Melanocyte - An epidermal cell that produces melanin

Radiation – The action or process of radiating, the process of emitting radiant energy in the form of waves or particles, or the combined processes of emission, transmission, and absorption of radiant energy (e.g., related to skin cancer, the ultraviolet radiation in sunlight or other light sources)

Regional - Any of the major subdivisions into which the body or one of its parts is divisible, an indefinite area surrounding a specified body part, affecting a particular region (e.g., a pain in the *region* of the heart)

Ultraviolet - Situated beyond the visible spectrum at its violet end, radiation having a wavelength shorter than wavelengths of visible light and longer than those of X rays, relating to, producing, or employing ultraviolet radiation

Ultraviolet Radiation -A & B (UV-A, UV-B) - One of the three types of invisible light rays (together with ultraviolet B and ultraviolet C) given off by the sun. Ultraviolet A and ultraviolet B, on the other hand, do penetrate the ozone layer in attenuated form and reach the surface of the planet. Because ultraviolet A is weaker than ultraviolet B, scientists long blamed ultraviolet B as the sole culprit in causing skin cancer in persons with a history of sunburn and repeated overexposure to ultraviolet radiation. Recent research, however, has also implicated ultraviolet A as a possible cause of skin cancer. In addition to natural light from the sun, artificial light from tanning lamps contains ultraviolet A and ultraviolet B.

Ultraviolet – C (UV-C) - Although ultraviolet C is the most dangerous type of ultraviolet light in terms of its potential to harm life on earth, it cannot penetrate earth's protective ozone layer. Therefore, it poses no threat to human, animal or plant life on earth.

Xeroderma Pigmentosum - A genetic condition inherited as a recessive autosomal trait that is caused by a defect in mechanisms that repair DNA mutations (as those caused by ultraviolet light) and is characterized by the development of pigment abnormalities and multiple skin cancers in body areas exposed to the sun

Appendix C:

Appendix C:

State of Nevada Health Division, Bureau of Health Planning and Statistics

Nevada Deaths Due to Malignant Melanomas 1998 - 2002

Table 1 Death Year * ICD-10 Code

Cross tabulation

Count

		ICD-10 Code								Total
		172.9	C43.3	C43.7	C43.9	C44.2	C44.3	C44.4	C44.9	
Death Year	1998	*52*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*52*
	1999	*0*	*1*	*1*	*55*	*0*	*3*	*12*	*6*	*78*
	2000	*0*	*0*	*0*	*47*	*0*	*2*	*7*	*7*	*63*
	2001	*0*	*0*	*0*	*62*	*1*	*0*	*10*	*5*	*78*
	2002	*0*	*0*	*0*	*57*	*0*	*2*	*6*	*5*	*70*
Total		*52*	*1*	*1*	*221*	*1*	*7*	*35*	*23*	*341*

In order to determine the correct ICD codes used for Malignant Melanoma Skin Cancer Deaths, a cross tab was run to see the distribution of causes of death by specific ICD codes associated with skin cancer and determine the representation of each code used. Codes were obtained from the *NIH National Cancer Institute, ICD-9 to ICD 10 Neoplasm's* book and the *WHO International Classification of Disease for Oncology ICD-O* book.

After reviewing the Nevada Health Division's interactive website and re-reviewing the ICD codes the two following ICD codes (172.9 & C43.9) were determined as the two codes to properly recognize malignant melanoma as cause of death. The selection of these two codes (and exclusion of the supplementary codes) was based on the current findings in the death data and blatant differences between current interactive website data and the above totals for each year.

Further reading into each ICD code was also referenced to determine specific designations for each code. The following tables are created with the use of the two selected codes.

Table 2 Death Year * ICD-10 Code Cross tabulation

Count

		ICD-10 Code		
		172.9	C43.9	Total
Death Year	1998	*52*	*0*	*52*
	1999	*0*	*55*	*55*
	2000	*0*	*47*	*47*
	2001	*0*	*62*	*62*
	2002	*0*	*57*	*57*
Total		*52*	*221*	*273*

Table 2 represents the exclusion of all other skin cancer codes aside from 172.9 & C43.9 for the years 1998 to 2002. The totals represented in the table depict an accurate representation of the number of deaths in Nevada due to malignant melanoma.

Table 3 provides malignant melanoma death information for males vs. females including total percentages for Nevada residents in each of the years of 1998 thru 2002.

Table 3 Death Year * Sex Cross tabulation

			Sex		Total
			Male	Female	
Death Year	1998	Count	42	10	52
		% within death yr	80.8%	19.2%	100.0%
		% of Total	15.4%	3.7%	19.0%
	1999	Count	35	20	55
		% within death yr	63.6%	36.4%	100.0%
		% of Total	12.8%	7.3%	20.1%
	2000	Count	29	18	47
		% within death yr	61.7%	38.3%	100.0%
		% of Total	10.6%	6.6%	17.2%
	2001	Count	42	20	62
		% within death yr	67.7%	32.3%	100.0%
		% of Total	15.4%	7.3%	22.7%
	2002	Count	40	17	57
		% within death yr	70.2%	29.8%	100.0%
		% of Total	14.7%	6.2%	20.9%
Total		Count	188	85	273
		% within death yr	68.9%	31.1%	100.0%
		% of Total	68.9%	31.1%	100.0%

Table 4 Sex * State of Residence Cross tabulation

			State of Residence	Total
			NV	
Sex	Male	Count	*188*	*188*
		% within Sex	*100.0%*	*100.0%*
		% of Total	*68.9%*	*68.9%*
	Female	Count	*85*	*85*
		% within Sex	*100.0%*	*100.0%*
		% of Total	*31.1%*	*31.1%*
Total		Count	*273*	*273*
		% within Sex	*100.0%*	*100.0%*
		% of Total	*100.0%*	*100.0%*

Table 4 provides the malignant melanoma deaths by gender for all years 1998-2002 combined.

Table 5 State of Residence * 10 Age Groups by 10 Years Cross tabulation

			10 Age Groups by 10 Years								Total
			20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+	
State of Residence	NV	Count	*5*	*18*	*43*	*53*	*57*	*64*	*31*	*2*	*273*
		% within State of Residence	*1.8%*	*6.6%*	*15.8%*	*19.4%*	*20.9%*	*23.4%*	*11.4%*	*.7%*	*100.0%*
		% of Total	*1.8%*	*6.6%*	*15.8%*	*19.4%*	*20.9%*	*23.4%*	*11.4%*	*.7%*	*100.0%*
Total		Count	*5*	*18*	*43*	*53*	*57*	*64*	*31*	*2*	*273*
		% within State of Residence	*1.8%*	*6.6%*	*15.8%*	*19.4%*	*20.9%*	*23.4%*	*11.4%*	*.7%*	*100.0%*
		% of Total	*1.8%*	*6.6%*	*15.8%*	*19.4%*	*20.9%*	*23.4%*	*11.4%*	*.7%*	*100.0%*

Table 5 provides the distribution of malignant melanoma deaths by age group for the years 1998 to 2002.

Appendix D:

Appendix D:

State of Nevada Health Division, Bureau of Health Planning and Statistics

Detailed Types of Cancer 2000 - 2003

Detailed Type of Cancer, ICD-O Code * Year of Diagnosis Cross tabulation

Count

		Year of Diagnosis				Total
		2000	2001	2002	2003	
Detailed	**Melanomas Of The Skin**	**454**	**477**	**477**	**623 ***	**2031**
Type of Cancer, ICD-O Code	Other Non-Epithelial Skin	40	58	38	42	178

* - 2003 Preliminary count for melanoma in Nevada with total count incomplete at this time

Melanomas Of The Skin

11 Age Groups by 10 Years * Year of Diagnosis Cross tabulation

Count

		Year of Diagnosis				
		2000	2001	2002	2003	Total
11 Age Groups by 10 Years	<1	0	0	0	4	4
	5-14	0	0	1	0	1
	15-24	12	10	7	11	40
	25-34	28	24	39	46	137
	35-44	64	62	62	85	273
	45-54	86	106	92	104	388
	55-64	82	88	99	117	386
	65-74	105	100	98	141	444
	75-84	71	71	62	99	303
	85+	6	16	15	15	52
	Unknown	0	0	2	1	3
Total		454	477	477	623	2031

Appendix E:

Appendix E:

State of Nevada Health Division, Bureau of Health Planning and Statistics
Incidence of Melanoma per 100,000 (Age Adjusted)

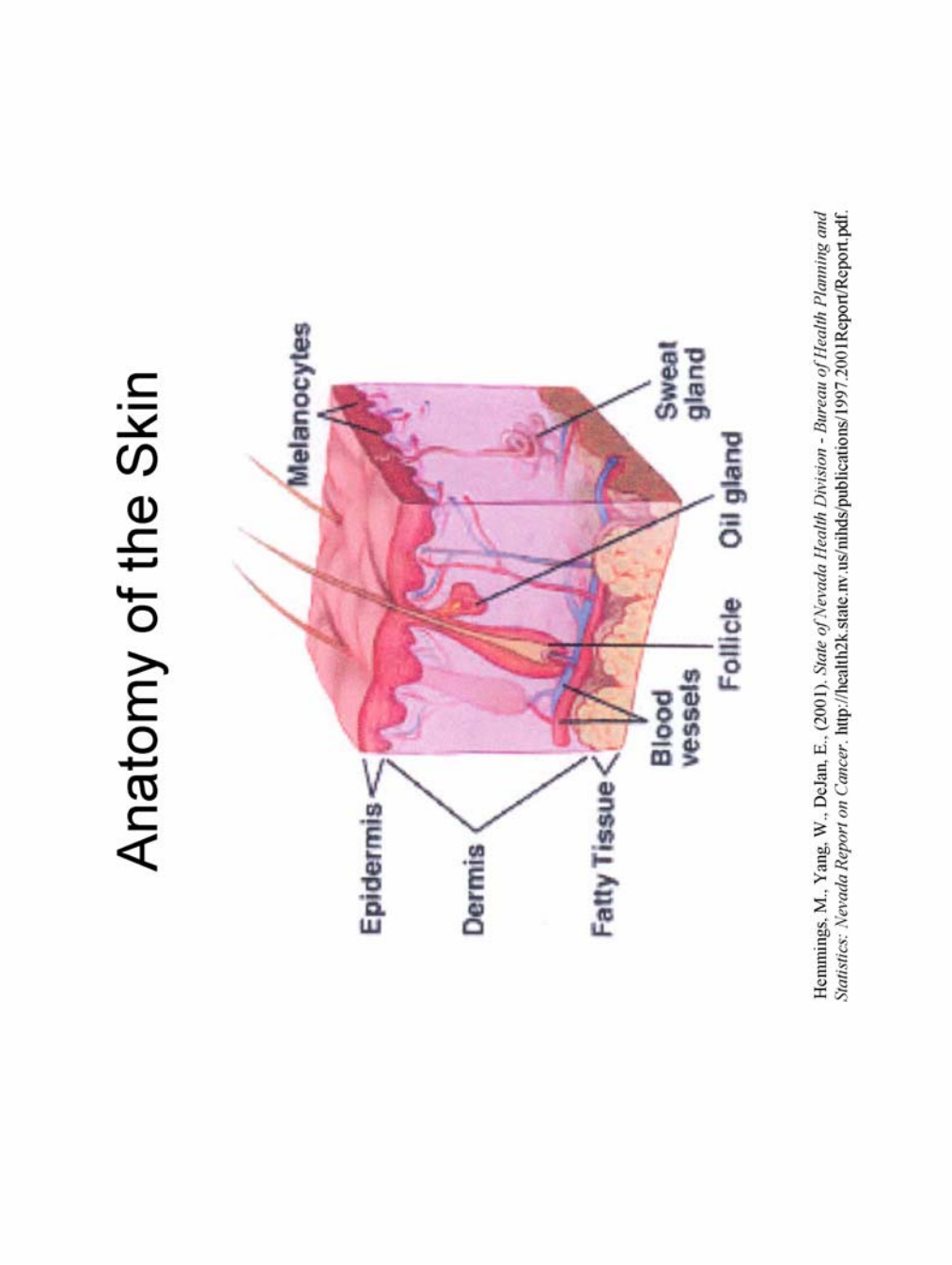
2000													
Age-Adjusted For Melanomas of the skin													
Age	*<1*	*1-4*	*5-14*	*15-24*	*25-34*	*35-44*	*45-54*	*55-64*	*65-74*	*75-84*	*>=85*		*Totals*
Actual Cases	0	0	0	12	28	64	86	82	105	71	6		454
Population	29515.33395	116937.4137	286368.2695	280448.7918	299633.665	320992.9637	269160.9625	192657.1783	131668.1652	74756.54745	16031.55825		2018171
US-2000 Stnd	13,818	55,317	145,565	138,646	135,573	162,613	134,834	87,247	66,037	44,842	15,508		*1,000,000*
Crude Rate	*0*	*0*	*0*	*4.278856017*	*9.344744358*	*19.93813175*	*31.9511415*	*42.56264974*	*79.74592783*	*94.97495861*	*37.42618096*		*22.49561776*
Exp-cases	*0*	*0*	*0*	*5.932462713*	*12.66895027*	*32.42199418*	*43.08100213*	*37.13463502*	*52.66181836*	*42.58867094*	*5.804052143*		*232.2935857*
Age-Adjusted													*23.22935857*
2001													
Age-Adjusted For Melanomas of the skin													
Age	*<1*	*1-4*	*5-14*	*15-24*	*25-34*	*35-44*	*45-54*	*55-64*	*65-74*	*75-84*	*>=85*		*Totals*
Actual Cases	0	0	0	10	24	62	106	88	100	71	16		477
Population	31148.75848	272900.4727	297213.2024	152457.8376	312830.5414	333252.7416	287622.6867	204700.401	137761.2807	79153.0208	17568.60286		2126610
US-2000 Stnd	13,818	55,317	145,565	138,646	135,573	162,613	134,834	87,247	66,037	44,842	15,508		*1,000,000*
Crude Rate	*0*	*0*	*0*	*6.5591905*	*7.671885198*	*18.6044981*	*36.85383834*	*42.98965687*	*72.58933677*	*89.69967195*	*91.07155603*		*22.43006954*
Exp-cases	*0*	*0*	*0*	*9.094055261*	*10.40100492*	*30.2533325*	*49.69150439*	*37.50718593*	*47.93582032*	*40.2231269*	*14.12337691*		*239.2294071*
Age-Adjusted													*23.92294071*

2002													
Age-Adjusted For Melanomas of the skin													
Age	*<1*	*1-4*	*5-14*	*15-24*	*25-34*	*35-44*	*45-54*	*55-64*	*65-74*	*75-84*	*>=85*	*Unknown*	*Totals*
Actual Cases	0	0	1	7	39	62	92	99	98	62	15	2	477
Adjusted for unknown	0	0	1.280018449	7.143684736	39.29234174	62.30960513	92.27120049	99.1975689	98.12944799	62.07495902	15.01713229		476.7159588
Population	32042.29365	280389.0151	308006.4366	158046.0987	321561.4501	340550.3248	298307.1159	217316.0129	142386.3873	82451.21691	18844.6756		2199901
US-2000 Stnd	13,818	55,317	145,565	138,646	135,573	162,613	134,834	87,247	66,037	44,842	15,508		*1,000,000*
Crude Rate	*0*	*0*	*0.32466854*	*4.4290875*	*12.12831948*	*18.20582612*	*30.8406991*	*45.55577782*	*68.8268042*	*75.1959793*	*79.5980802*		*21.68279364*
Exp-cases	*0*	*0*	*0.47260376*	*6.140752655*	*16.44272657*	*29.60504004*	*41.58374822*	*39.74604948*	*45.45115669*	*33.71938104*	*12.34407028*		*225.5055287*
Age-Adjusted													*22.55055287*

Appendix F:

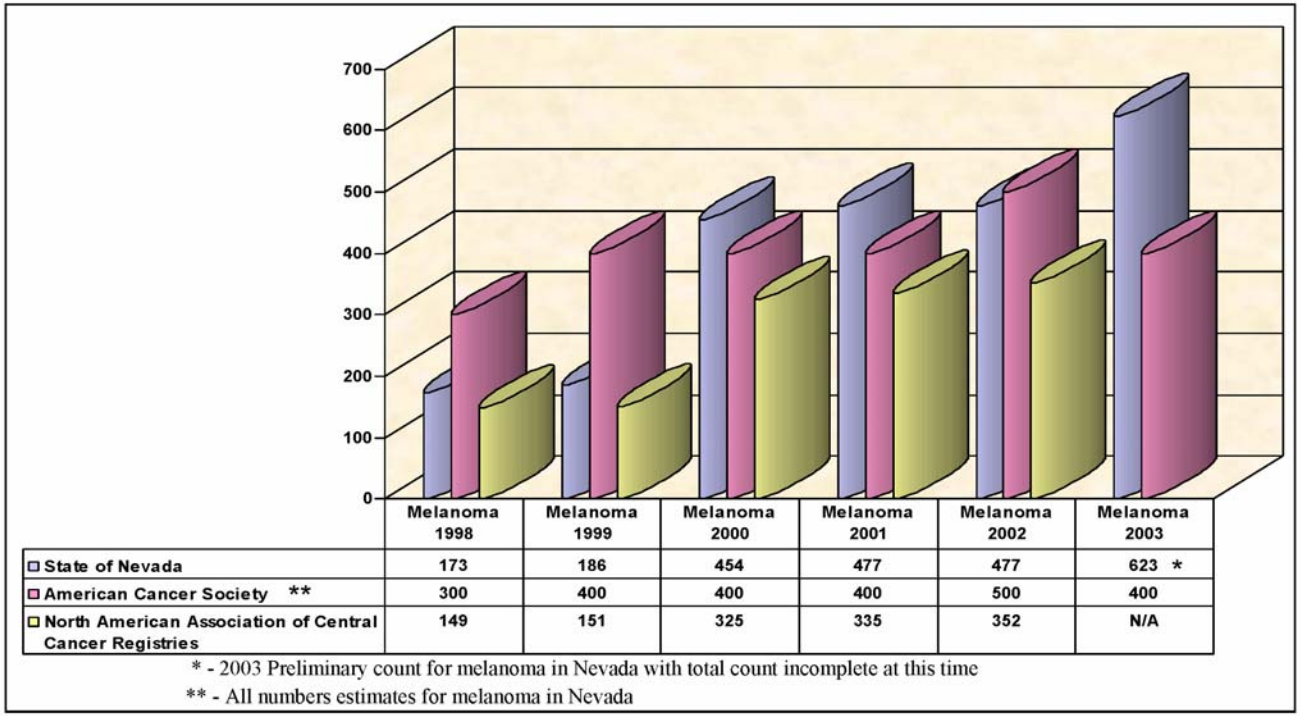
Appendix F:

Table of Figures



Hemmings, M., Yang, W., DeJan, E., (2001). *State of Nevada Health Division - Bureau of Health Planning and Statistics: Nevada Report on Cancer.* http://health2k.state.nv.us/nihds/publications/1997.2001Report/Report.pdf.

1998 - 2003 Variations in National and State Incidence Counts or Estimates for Melanoma By Total, and Type – State of Nevada



	Melanoma 1998	Melanoma 1999	Melanoma 2000	Melanoma 2001	Melanoma 2002	Melanoma 2003
State of Nevada	173	186	454	477	477	623 *
American Cancer Society **	300	400	400	400	500	400
North American Association of Central Cancer Registries	149	151	325	335	352	N/A

* - 2003 Preliminary count for melanoma in Nevada with total count incomplete at this time

** - All numbers estimates for melanoma in Nevada

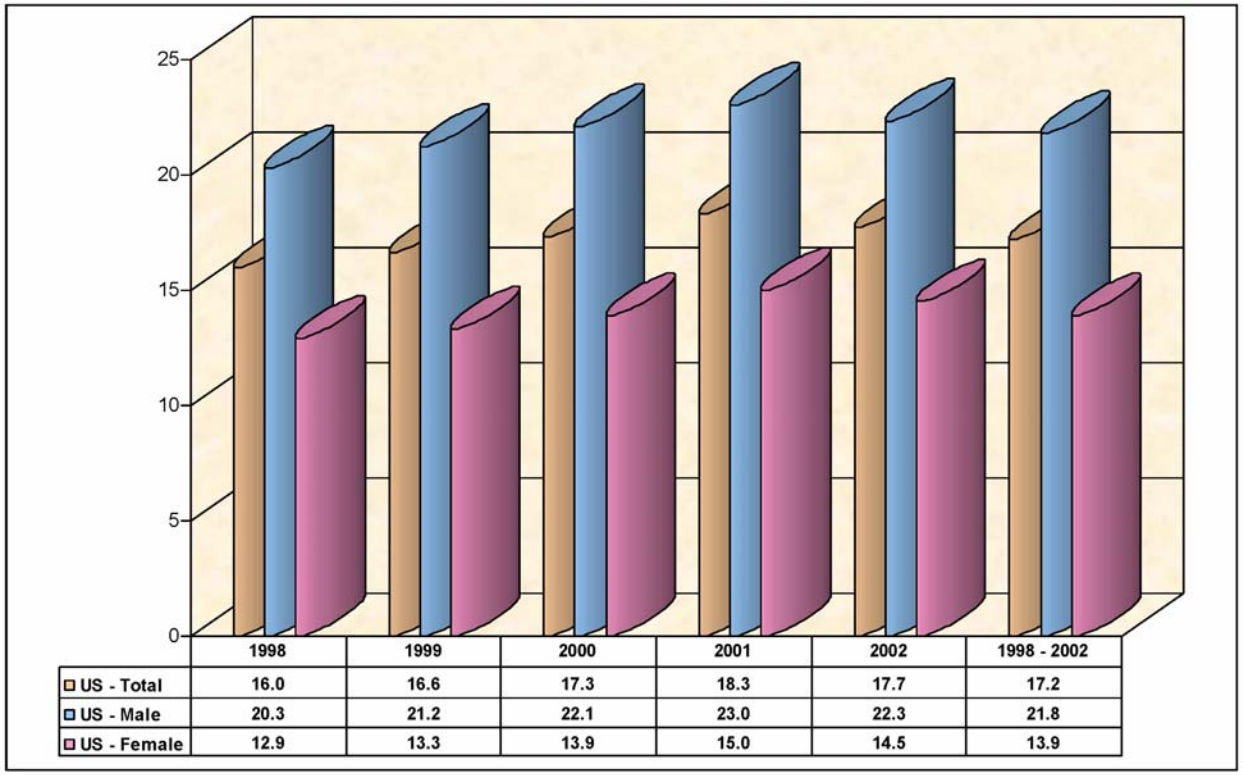
State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Detailed Types of Cancer 2000 – 2003 and Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports.* Carson City, NV. November 2 and 3, 2005.. See Appendix B and C.

State of Nevada Health Division - Bureau of Health Planning and Statistics. Nevada Interactive Health Database – Cancer Module. Retrieved September 26, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?.

American Cancer Society. Cancer Facts and Figures 1998 - 2002. [Online] Available: http://www.cancer.org/docroot/STT/stt_0.asp

The North American Association of Central Cancer Registries, CINA + Online. 1998 - 2002 Skin Cancer (Excluding Basal and Squamous) and Melanoma. Retrieved September 27, 2005, from http://www.naaccr.org/cinap/index.htm

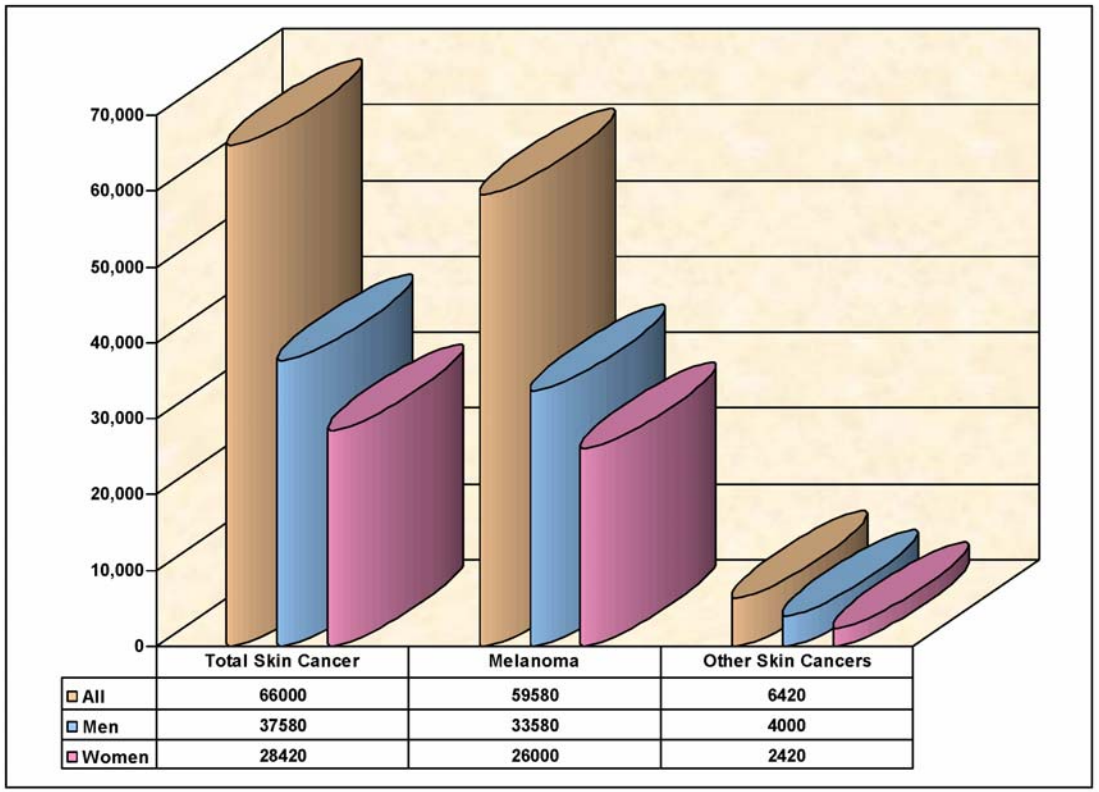
1998 - 2002 Incidence Rate Per 100,000 for Skin Cancer (Excluding Basal and Squamous) By Total and Gender – National



	1998	1999	2000	2001	2002	1998 - 2002
US - Total	16.0	16.6	17.3	18.3	17.7	17.2
US - Male	20.3	21.2	22.1	23.0	22.3	21.8
US - Female	12.9	13.3	13.9	15.0	14.5	13.9

The North American Association of Central Cancer Registries, CINA + Online. 1998 - 2002 Skin Cancer (Excluding Basal and Squamous) and Melanoma. Retrieved September 30, 2005, from http://www.naaccr.org/cinap/index.htm

2005 Incidence Estimates for Skin Cancer (Excluding Basal and Squamous) By Total, Type, and Gender - National

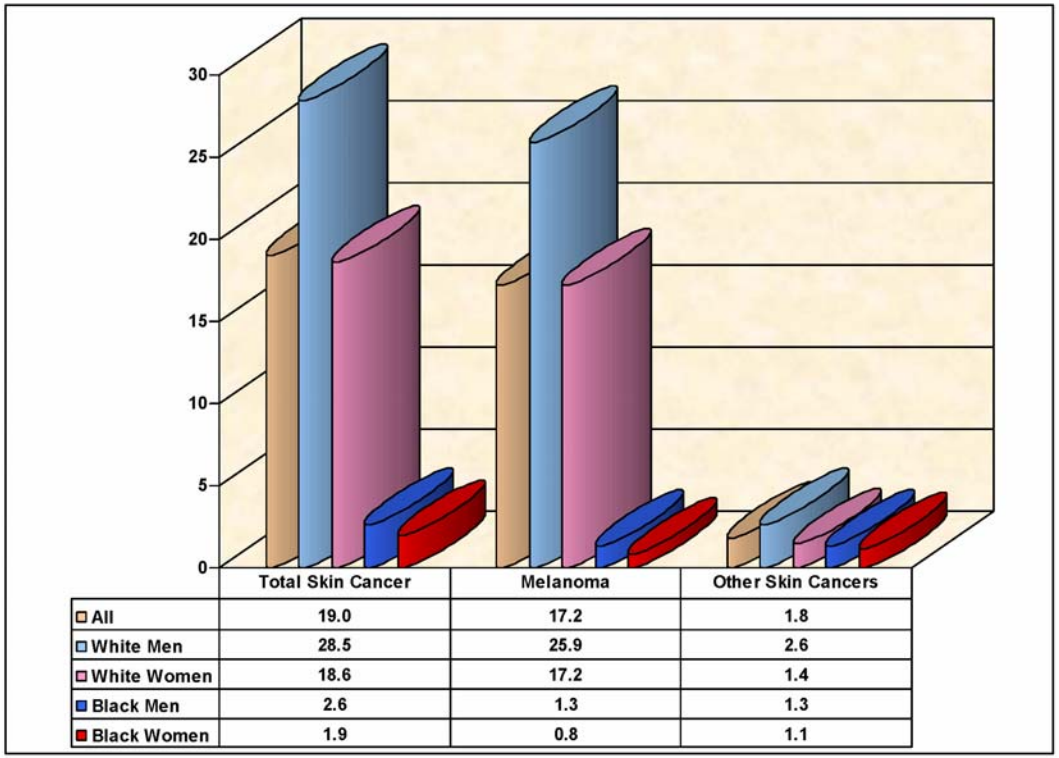


	Total Skin Cancer	Melanoma	Other Skin Cancers
All	66000	59580	6420
Men	37580	33580	4000
Women	28420	26000	2420

National Cancer Institute, Cancer Stat Facts. Cancer of the Skin (Excl. Basal and Squamous). Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/skin.html?statfacts_page=skin.html&x=16&y=12

National Cancer Institute, Cancer Stat Facts. Melanoma of the Skin. Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/melan.html?statfacts_page=melan.html&x=15&y=15

1998 - 2002 Incidence Rate Per 100,000 for Skin Cancer (Excluding Basal and Squamous) By Total, Type, Gender, and Race - National

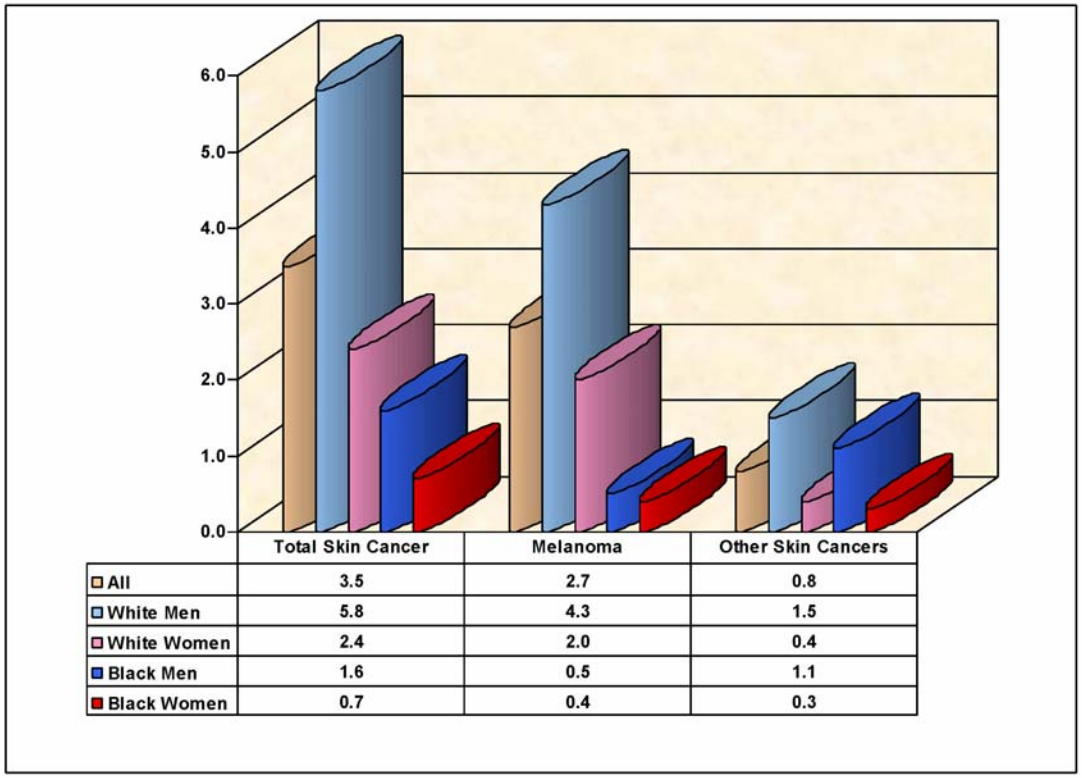


	Total Skin Cancer	Melanoma	Other Skin Cancers
All	19.0	17.2	1.8
White Men	28.5	25.9	2.6
White Women	18.6	17.2	1.4
Black Men	2.6	1.3	1.3
Black Women	1.9	0.8	1.1

National Cancer Institute, Cancer Stat Facts. Cancer of the Skin (Excl. Basal and Squamous). Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/skin.html?statfacts_page=skin.html&x=16&y=12

National Cancer Institute, Cancer Stat Facts. Melanoma of the Skin. Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/melan.html?statfacts_page=melan.html&x=15&y=15

1998 - 2002 Mortality Rate Per 100,000 for Skin Cancer (Excluding Basal and Squamous) By Total, Type, Gender, and Race - National

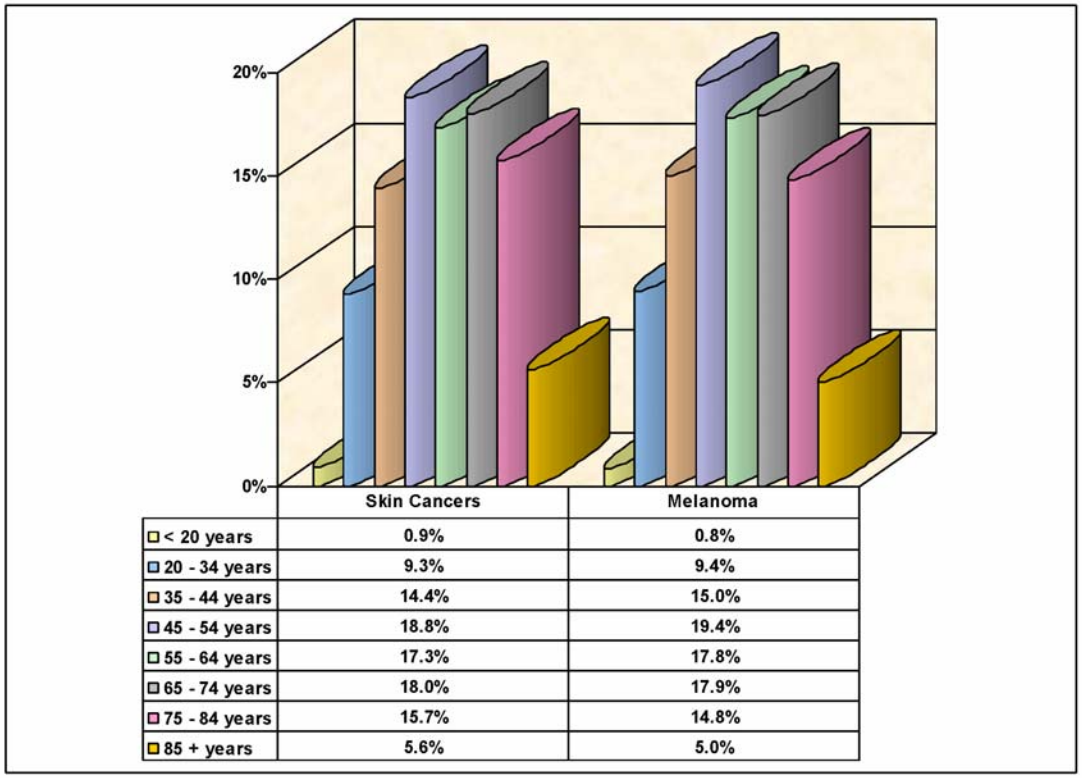


	Total Skin Cancer	Melanoma	Other Skin Cancers
All	3.5	2.7	0.8
White Men	5.8	4.3	1.5
White Women	2.4	2.0	0.4
Black Men	1.6	0.5	1.1
Black Women	0.7	0.4	0.3

National Cancer Institute, Cancer Stat Facts. Cancer of the Skin (Excl. Basal and Squamous). Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/skin.html?statfacts_page=skin.html&x=16&y=12

National Cancer Institute, Cancer Stat Facts. Melanoma of the Skin. Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/melan.html?statfacts_page=melan.html&x=15&y=15

1998 - 2002 Diagnosis of Skin Cancer (Excluding Basal And Squamous) - By Age Group, Type, and Percentage - National

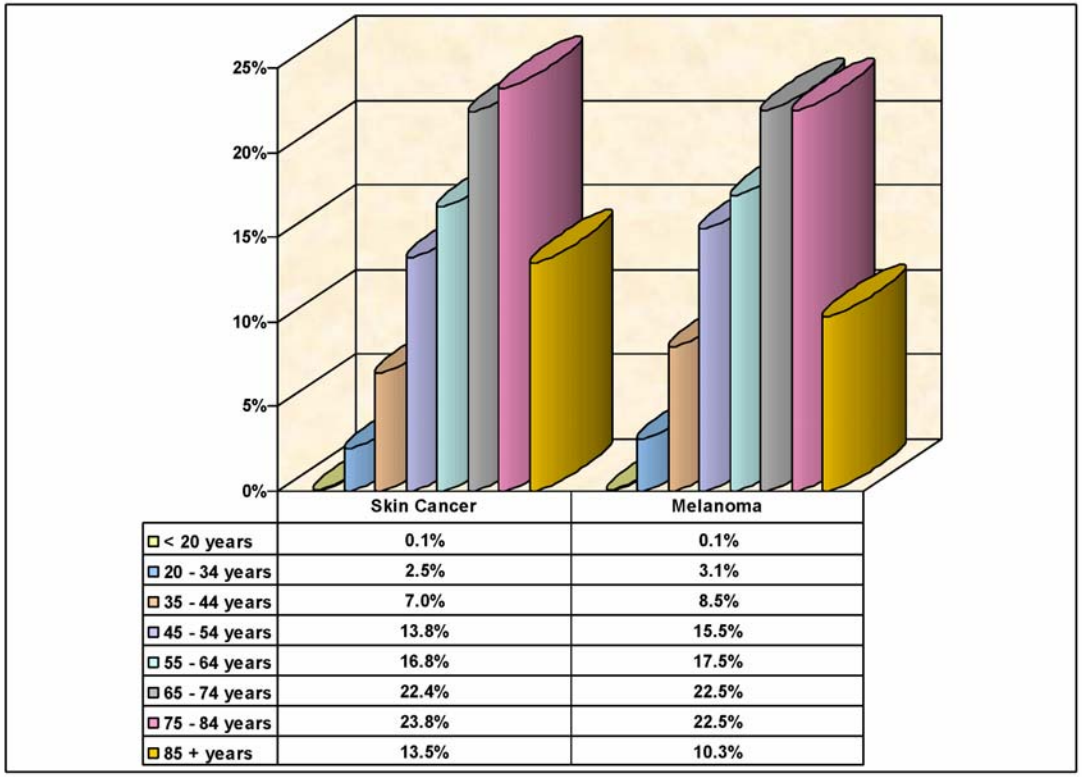


	Skin Cancers	Melanoma
< 20 years	0.9%	0.8%
20 - 34 years	9.3%	9.4%
35 - 44 years	14.4%	15.0%
45 - 54 years	18.8%	19.4%
55 - 64 years	17.3%	17.8%
65 - 74 years	18.0%	17.9%
75 - 84 years	15.7%	14.8%
85 + years	5.6%	5.0%

National Cancer Institute, Cancer Stat Facts. Cancer of the Skin (Excl. Basal and Squamous). Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/skin.html?statfacts_page=skin.html&x=16&y=12

National Cancer Institute, Cancer Stat Facts. Melanoma of the Skin. Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/melan.html?statfacts_page=melan.html&x=15&y=15

1998 - 2002 Mortality Rate for Skin Cancer (Excluding Basal and Squamous) - By Age Group, Type, and Percentage - National

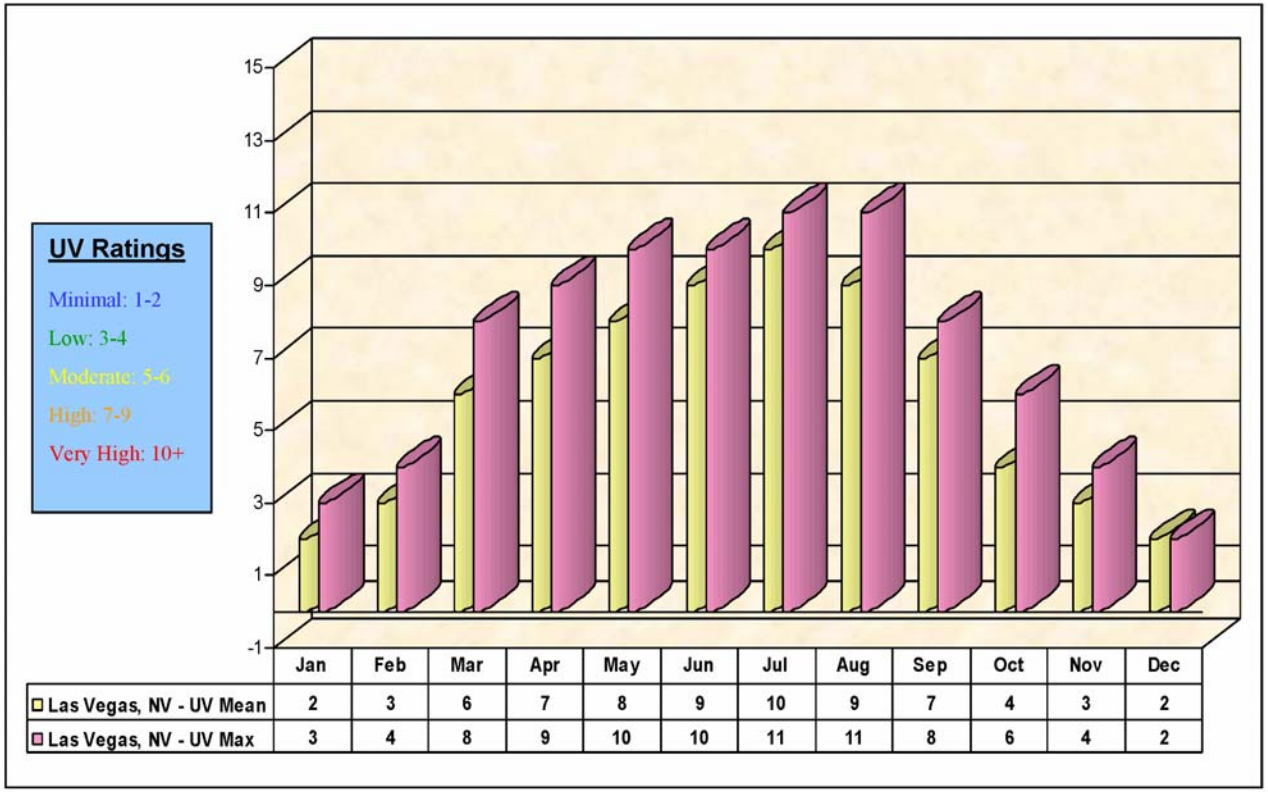


	Skin Cancer	Melanoma
< 20 years	0.1%	0.1%
20 - 34 years	2.5%	3.1%
35 - 44 years	7.0%	8.5%
45 - 54 years	13.8%	15.5%
55 - 64 years	16.8%	17.5%
65 - 74 years	22.4%	22.5%
75 - 84 years	23.8%	22.5%
85 + years	13.5%	10.3%

National Cancer Institute, Cancer Stat Facts. Cancer of the Skin (Excl. Basal and Squamous). Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/skin.html?statfacts_page=skin.html&x=16&y=12

National Cancer Institute, Cancer Stat Facts. Melanoma of the Skin. Retrieved September 19, 2005, from http://seer.cancer.gov/statfacts/html/melan.html?statfacts_page=melan.html&x=15&y=15

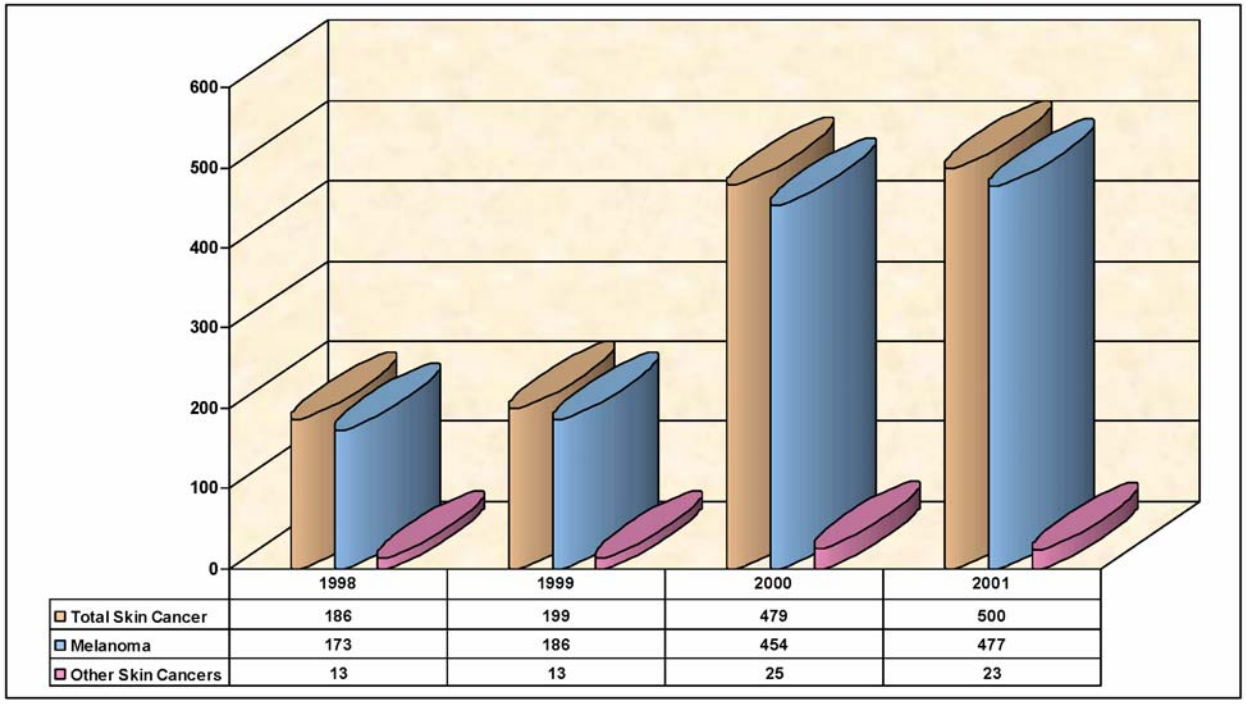
January 1997 – UV Index: Monthly Means and Maximums - Nevada



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Las Vegas, NV - UV Mean	2	3	6	7	8	9	10	9	7	4	3	2
Las Vegas, NV - UV Max	3	4	8	9	10	10	11	11	8	6	4	2

The National Oceanic and Atmospheric Administration's, National Weather Service – Climate Prediction Center. UV Index: Monthly Means and Maximums (January 1997). Retrieved November 17, 2005, from http://www.cpc.ncep.noaa.gov/products/stratosphere/uv_index/uv_meanmax.html

1998 - 2001 Incidence for Skin Cancer (Excluding Basal and Squamous) By Total and Type – Nevada

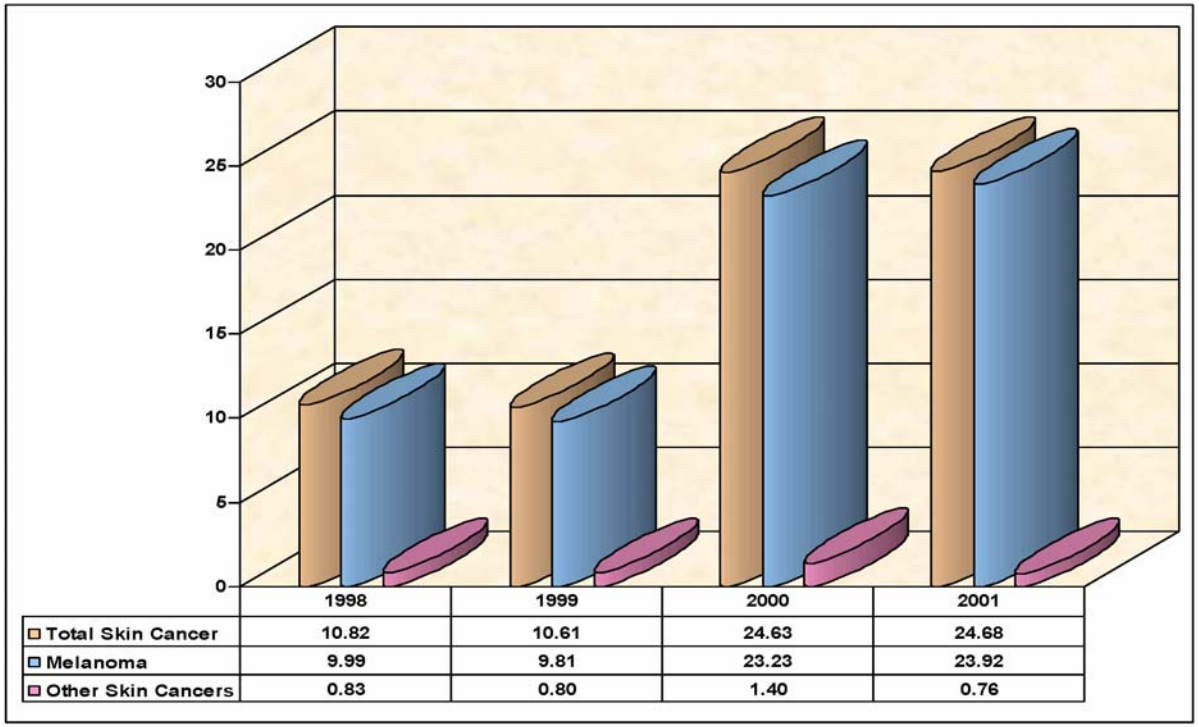


	1998	1999	2000	2001
Total Skin Cancer	186	199	479	500
Melanoma	173	186	454	477
Other Skin Cancers	13	13	25	23

State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Detailed Types of Cancer 2000 – 2003 and Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports*. Carson City, NV. November 2 and 3, 2005.. See Appendix B and C.

State of Nevada Health Division - Bureau of Health Planning and Statistics. Nevada Interactive Health Database – Cancer Module. Retrieved September 26, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?.

1998 - 2001 Incidence Rate Per 100,000 for Skin Cancer (Excluding Basal and Squamous) By Total and Type – Nevada

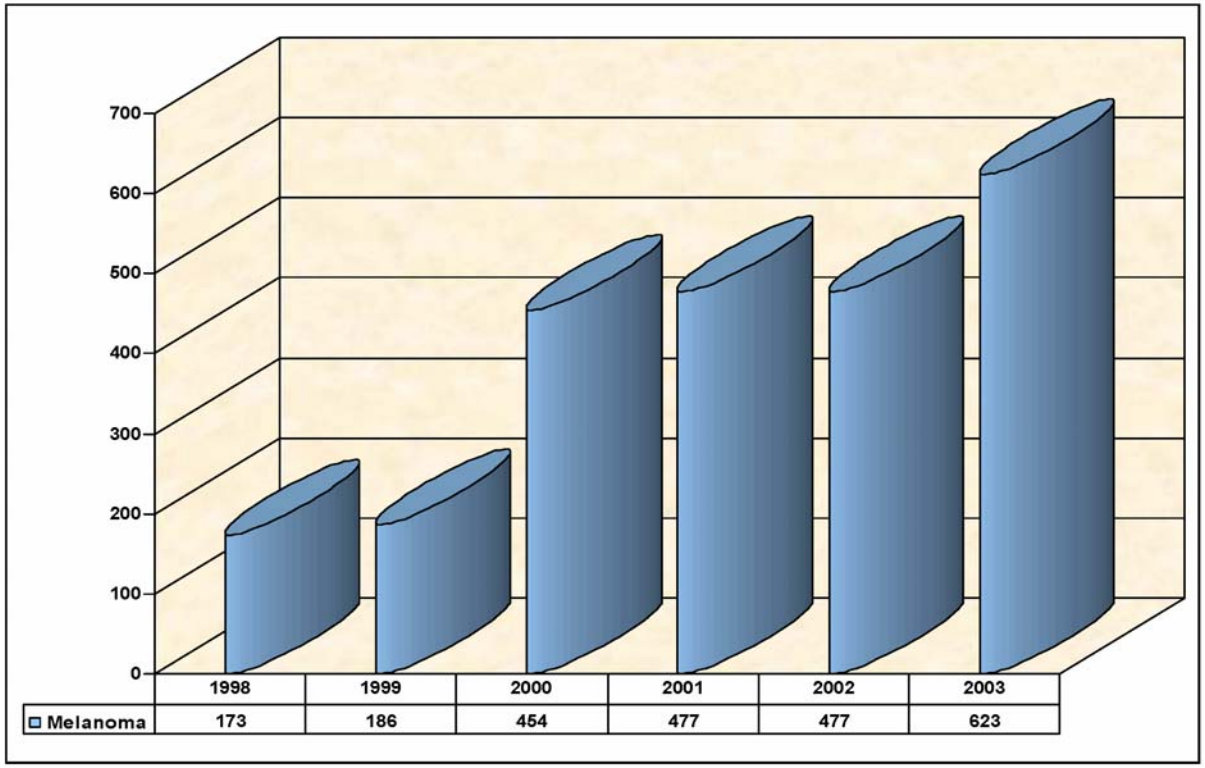


	1998	1999	2000	2001
Total Skin Cancer	10.82	10.61	24.63	24.68
Melanoma	9.99	9.81	23.23	23.92
Other Skin Cancers	0.83	0.80	1.40	0.76

State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports*. Carson City, NV. November 3, 2005.. See Appendix C.

State of Nevada Health Division - Bureau of Health Planning and Statistics. Nevada Interactive Health Database – Cancer Module. Retrieved September 27, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?.

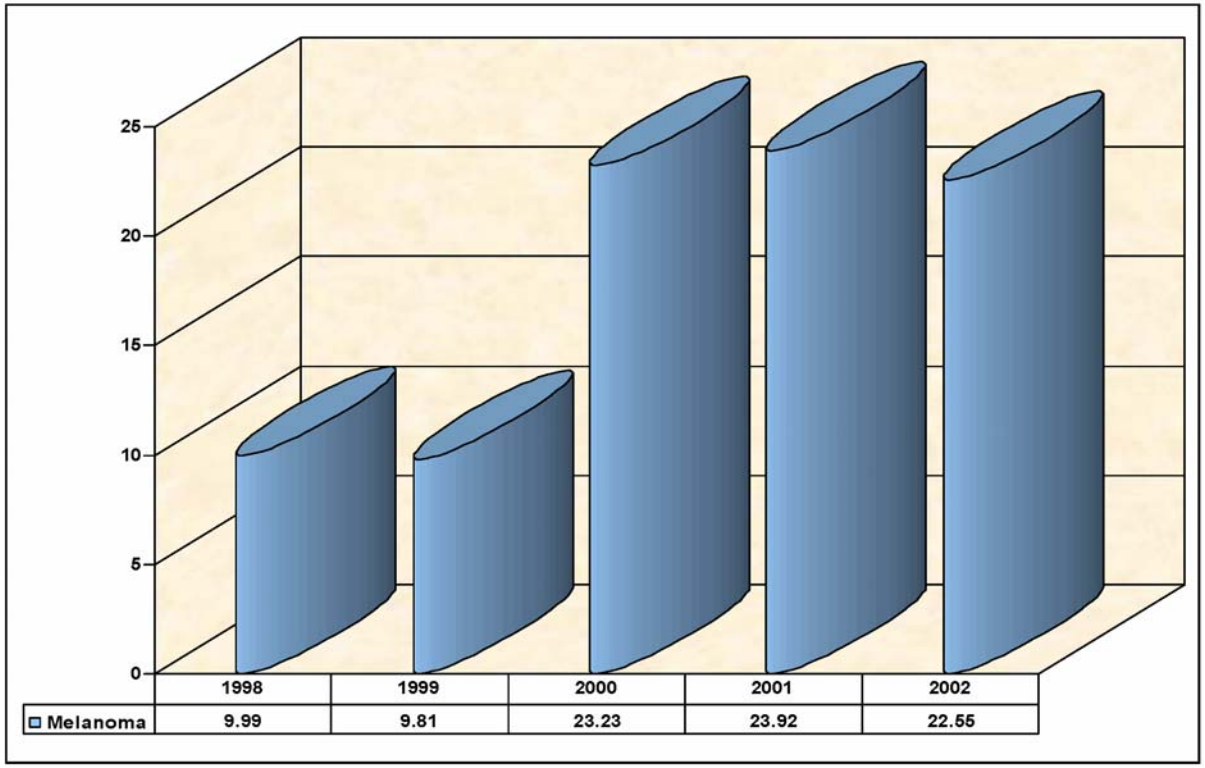
1998 - 2003 Incidence for Melanoma By Total - Nevada



State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Detailed Types of Cancer 2000 – 2003 and Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports*. Carson City, NV. November 2 and 3, 2005.. See Appendix B and C.

State of Nevada Health Division - Bureau of Health Planning and Statistics. Nevada Interactive Health Database – Cancer Module. Retrieved September 26, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?.

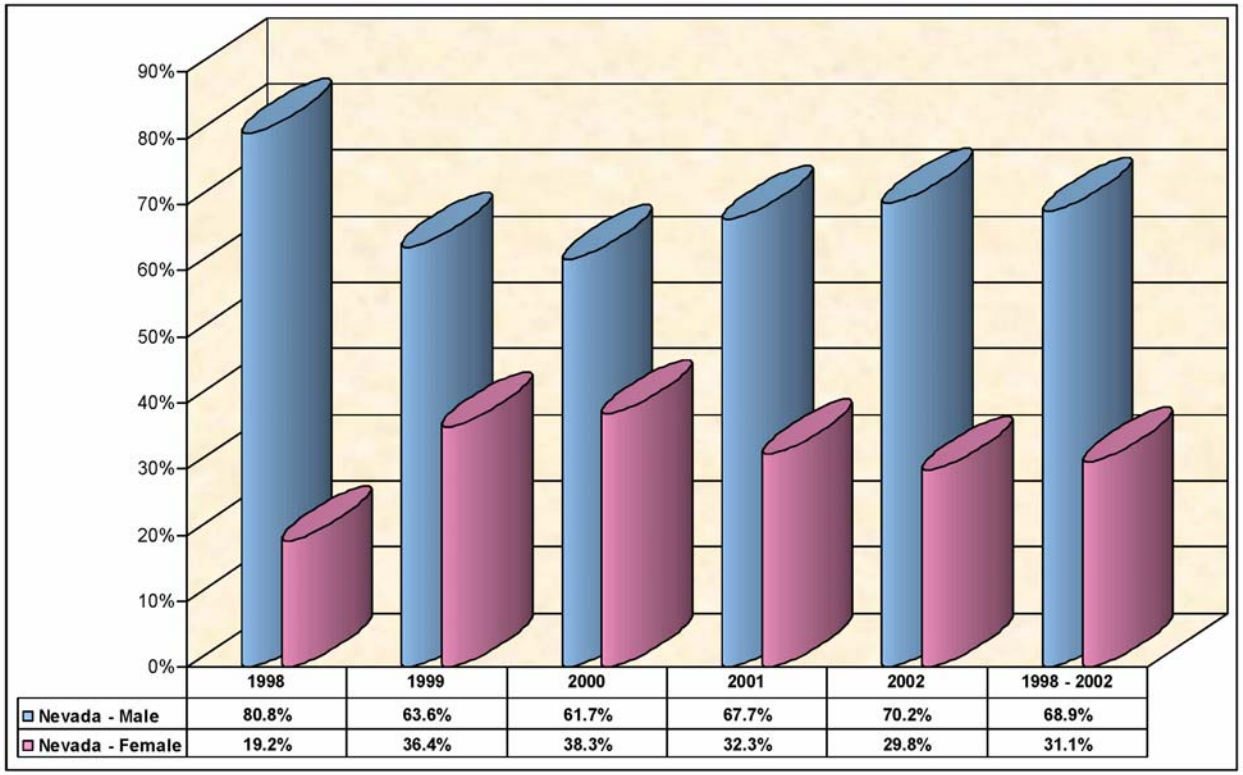
1998 - 2002 Incidence Rate Per 100,000 for Melanoma By Total - Nevada



State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Detailed Types of Cancer 2000 – 2003 and Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports*. Carson City, NV. November 2 and 3, 2005.. See Appendix B and C.

State of Nevada Health Division - Bureau of Health Planning and Statistics. Nevada Interactive Health Database – Cancer Module. Retrieved September 26, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?.

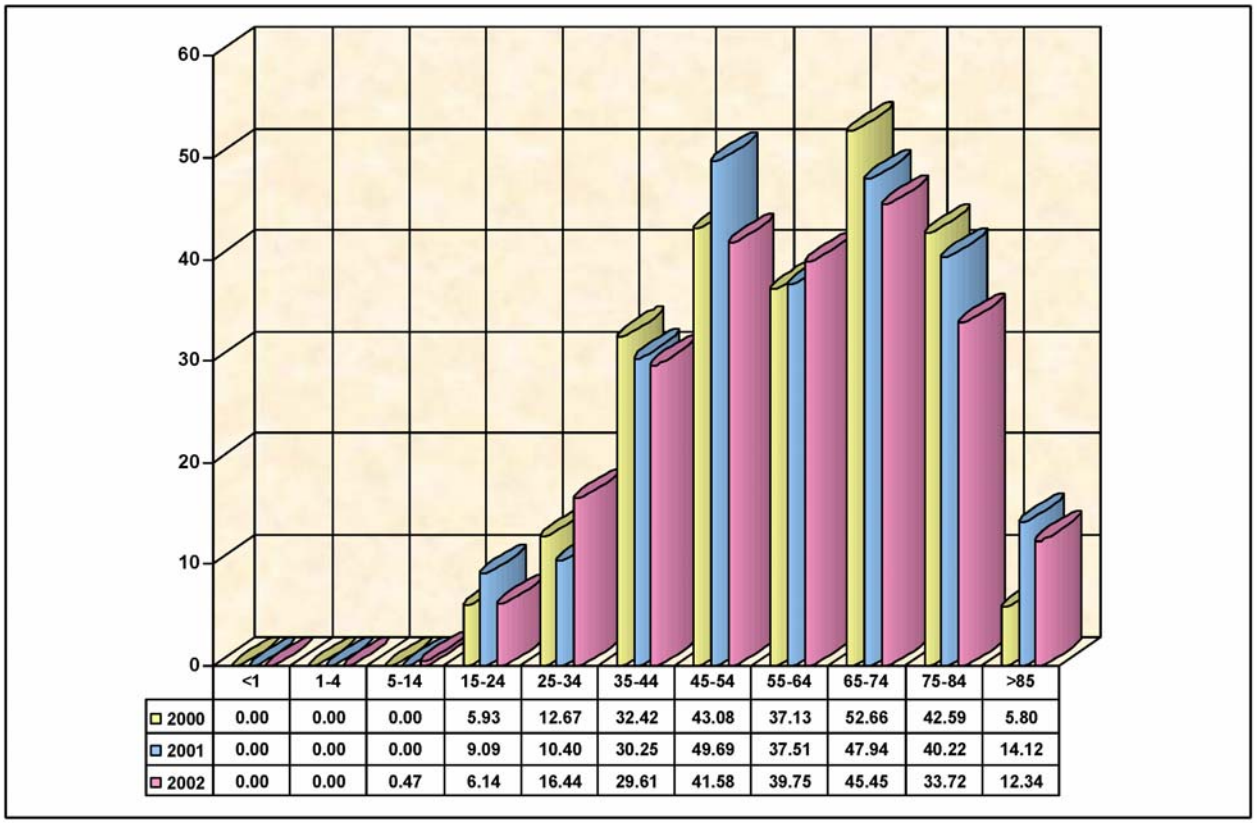
1998 - 2002 Mortality Rate for Melanoma By Gender and Percentage – Nevada



	1998	1999	2000	2001	2002	1998 - 2002
Nevada - Male	80.8%	63.6%	61.7%	67.7%	70.2%	68.9%
Nevada - Female	19.2%	36.4%	38.3%	32.3%	29.8%	31.1%

State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Deaths Due To Malignant Melanomas – Special Report.* Carson City, NV. October 10, 2005. See Appendix A.

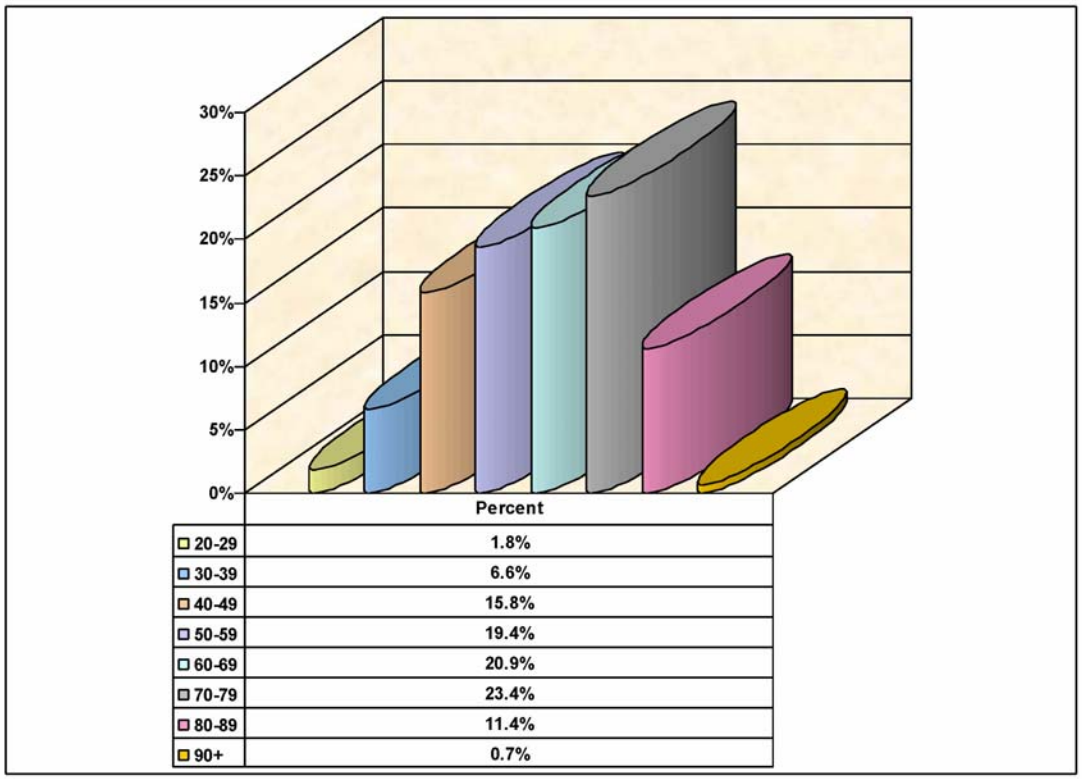
2000 - 2002 Incidence Rate Per 100,000 for Melanoma By Age Group - Nevada



	<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	>85
2000	0.00	0.00	0.00	5.93	12.67	32.42	43.08	37.13	52.66	42.59	5.80
2001	0.00	0.00	0.00	9.09	10.40	30.25	49.69	37.51	47.94	40.22	14.12
2002	0.00	0.00	0.47	6.14	16.44	29.61	41.58	39.75	45.45	33.72	12.34

State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports*. Carson City, NV. November 3, 2005.. See Appendix C.

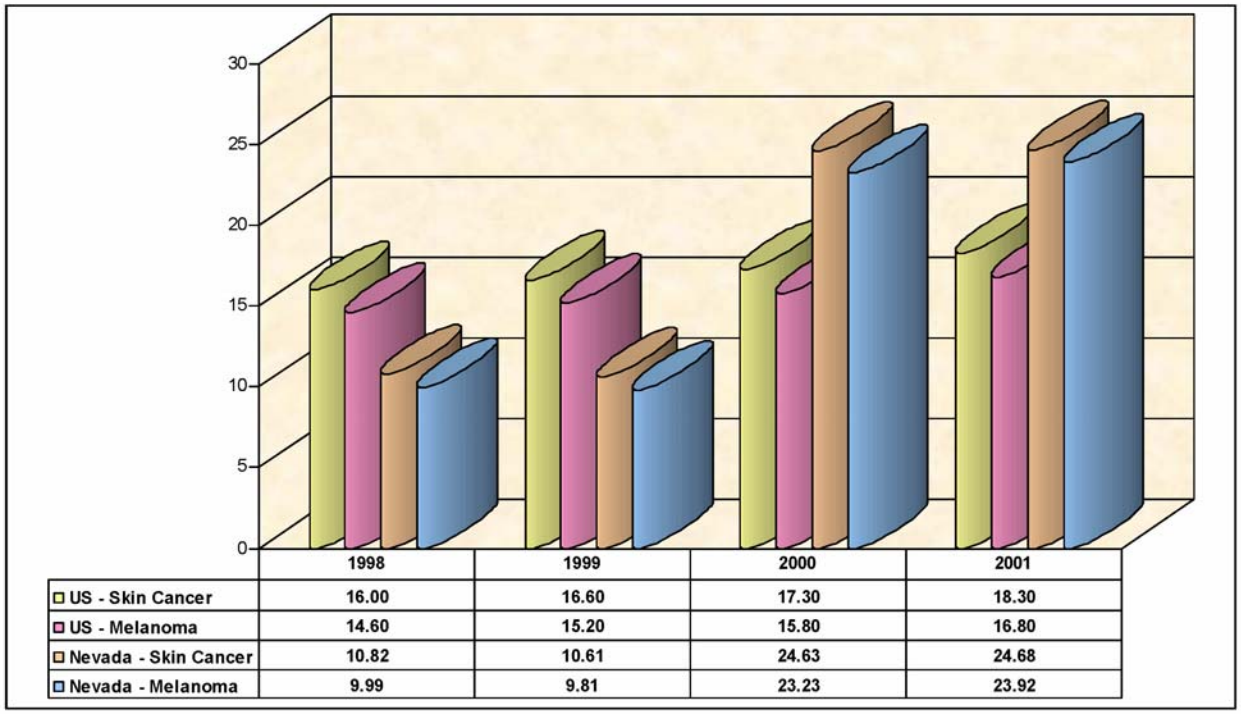
1998 - 2002 Mortality Rate for Melanoma By Age Group and Percentage - Nevada



	Percent
20-29	1.8%
30-39	6.6%
40-49	15.8%
50-59	19.4%
60-69	20.9%
70-79	23.4%
80-89	11.4%
90+	0.7%

State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Deaths Due To Malignant Melanomas – Special Report.* Carson City, NV. October 10, 2005. See Appendix A.

1998 - 2001 Incidence Rate Per 100,000 for Skin Cancer (Excluding Basal and Squamous) By Type – Nevada Versus National



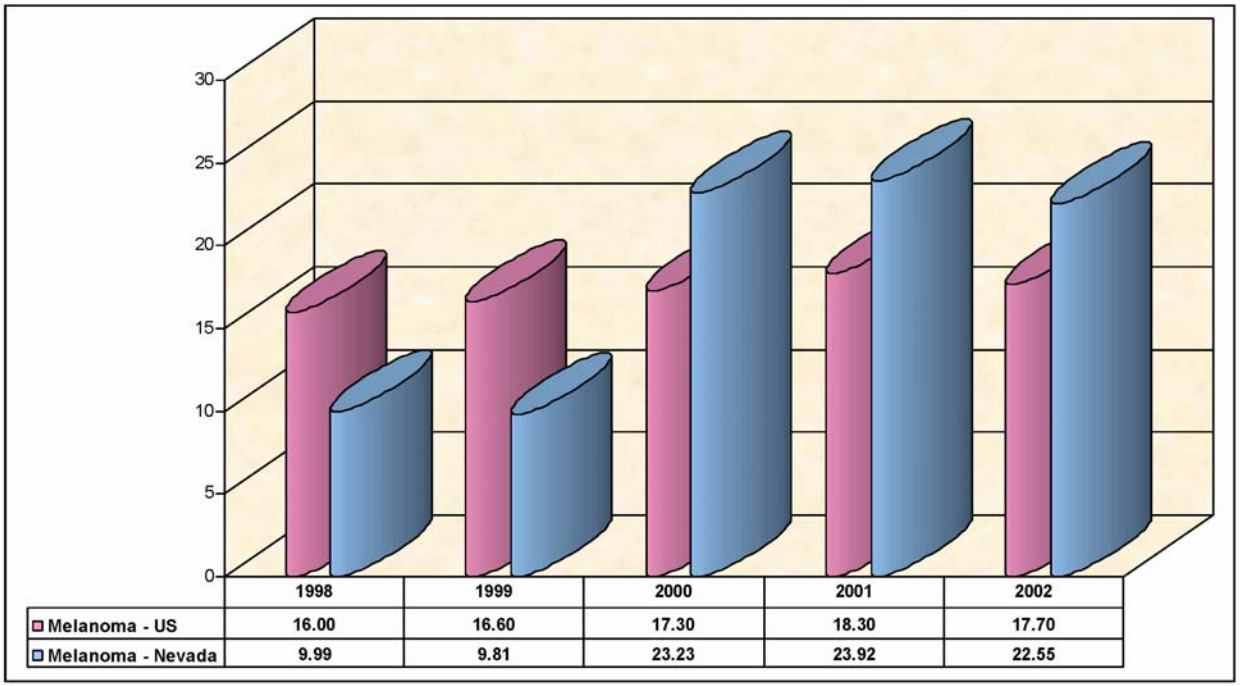
	1998	1999	2000	2001
US - Skin Cancer	16.00	16.60	17.30	18.30
US - Melanoma	14.60	15.20	15.80	16.80
Nevada - Skin Cancer	10.82	10.61	24.63	24.68
Nevada - Melanoma	9.99	9.81	23.23	23.92

The North American Association of Central Cancer Registries, CINA + Online. 1998 - 2002 Skin Cancer (Excluding Basal and Squamous) and Melanoma. Retrieved September 27, 2005, from http://www.naaccr.org/cinap/index.htm

State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Detailed Types of Cancer 2000 – 2003 and Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports*. Carson City, NV. November 2 and 3, 2005.. See Appendix B and C.

State of Nevada Health Division, Bureau of Health Planning and Statistics, Nevada Interactive Health Database – Cancer Module. Retrieved September 26, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?

1998 - 2002 Incidence Rate Per 100,000 for Melanoma – Nevada versus National



	1998	1999	2000	2001	2002
Melanoma - US	16.00	16.60	17.30	18.30	17.70
Melanoma - Nevada	9.99	9.81	23.23	23.92	22.55

State of Nevada Health Division, Bureau of Health Planning and Statistics (2005). *Detailed Types of Cancer 2000 – 2003 and Incidence of Melanoma per 100,000 (Age Adjusted) 2000 - 2002 – Special Reports*. Carson City, NV. November 2 and 3, 2005.. See Appendix B and C.

State of Nevada Health Division - Bureau of Health Planning and Statistics. Nevada Interactive Health Database – Cancer Module. Retrieved September 26, 2005, from http://health2k.state.nv.us/nihds/measures/cancer/long_form.html?.

The North American Association of Central Cancer Registries, CINA + Online. 1998 - 2002 Skin Cancer (Excluding Basal and Squamous) and Melanoma. Retrieved September 30, 2005, from http://www.naaccr.org/cinap/index.htm